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EXTERNAL STORE AIRLOADS PREDICTION TECHNIQUE,

DETAILED DATA, BOOK 3. MER CARRIAGE SIDE FORCE AND YAWING MOMENT PREDICTIONS

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AN MARY 1973- JUNE 1975

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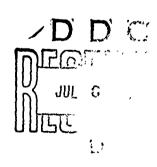
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SECTION IV

MER CARRIAGE AIRLOAD PREDICTION

The technique for predicting the airloads of a store carried on a multiple ojector rack (MER) is presented in this section. The approach consists of inserting the MER/store configuration into the flow-field of the base wing (45° sweep) as outlined in Subsection 2.3 to obtain an initial prediction for the side force, yawing moment, normal force, and pitching moment components for the two rack centerline stations (MER stations 1, 2). The MER shoulder stores are treated as increments to be added to the initial predictions made for MER stations 1 and 2 for these four components. The rolling moment and axial force components are predicted in a manner similar to that used for the single carriage predictions.

The method contained in this section has been developed primarily from data obtained on a fully loaded MER carrying Mll7 stores. Since the data base for the method is restricted to essentially one store type, a scaling factor has been defined in an attempt to scale the airloads predicted herein to other store types based on differences in isolated aerodynamic characteristics and physical size. The scaling factors for side force and normal force are presented below.

$$K_{\text{SCALE}_{\text{SF}}} = \frac{\left(\frac{\text{SF}}{\text{q}}\right)_{\psi_{\text{ISO}}} \text{SPA}}{96}$$

where

 $\left(\frac{SF}{q}\right)_{\Psi_{\mathrm{ISO}}}$ - Store isolated characteristics, $^{\mathrm{C}}_{\mathrm{L}}$ $^{\mathrm{S}}_{\mathrm{REF}}$, where $^{\mathrm{C}}_{\mathrm{L}}$ is obtained from $^{\alpha}_{\mathrm{ISO}}$ the method referenced in Subsection 2.2, $\frac{\mathrm{ft}^{2}}{\mathrm{des}}$

SPA - Store total side projected area as defined in Subsection 2.2, in²

$$K_{\text{GCALL}_{\text{MF}}} = \frac{\left(\frac{\text{NF}}{q}\right)_{\alpha_{\text{ISO}}}^{\text{PPA}}}{9\ell}$$

where

FIA - Store plan projected area as defined in Supergricin 2.7, in².

The scaling factors for yawing moment and pitching moment are presented letter.

$$I_{\text{SCALE}_{YM}} = \frac{\left(\frac{\text{SF}}{\text{q}}\right)_{\Psi_{\text{ISO}}} \text{SIA}}{71.5}$$

where

$$\left(\frac{\partial f}{\partial x}\right)_{\Psi_1(C)}$$
 - Lettined above

TPA - Defined above-

$$R_{\rm GCALE_{PM}} = \frac{\left(\frac{\rm NF}{\rm q}\right)_{\alpha_{\rm ISO}}}{71.4}$$

where

$$\left(\frac{\text{HF}}{\text{q}}\right)_{\alpha_{\text{ISO}}}$$
 - Defined above

PPA - Defined above.

These factors are used in the equations throughout Section IV where required.

The airloads predicted for MER/store configurations assume that the MER is fully loaded.

4.1 SIDE FORCE

4.1.1 Basic Airload

The basic captive store airload is that airload generated by a zero-yaw pitch excursion of the parent aircraft.

4.1.1.1 Slope Prediction

The prediction of the variation of captive store side force with angle of attack is divided into two sections, fuselage centerline-mounted configurations and wing pylon-mounted configurations. The technique presented in this section predicts the slope, $\left(\frac{SF}{q}\right)_{\alpha}$, at M = 0.5.

FUSELAGE CENTERLINE-MOUNTED STORES

MER STATIONS 1 and 2 (MS1,2):

$$\left(\frac{\text{SF}}{\text{q}}\right)_{\alpha_{\text{PRED}}} = 0$$
, due to symmetry

MS1.,2

MER STATIONS 3,4,5,6 (MS3-6):

$$\frac{\left(\frac{SF}{q}\right)_{\alpha_{PRED}}}{\alpha_{PRED}} = c_{y_{\alpha_{E}}} = f(d)$$
MS3-6 MS3-6

where

 $c_{y_{\alpha_{\underline{c}}}}$ - Variation of $c_{y_{\alpha_{\underline{c}}}}$ presented as a function of store diameter, Figure 330.

 S_{REF} - Store reference area, $\frac{\pi d^2}{4}$, ft^2 .

WING MOUNTED STORES

MER STATION 1:

$$\frac{\left(\frac{SF}{q}\right)_{\alpha_{\text{PRED}}}}{\text{MS1}} = \kappa_{\text{C}} \sum_{\text{SF}} \left(\frac{SF}{q}\right)_{\psi_{\text{ISO}}} \kappa_{\text{MS1}} \frac{\kappa_{\text{LE}}}{\kappa_{\text{LE}}} \frac{\kappa_{\text{E}} \kappa_{\text{LE}}}{\kappa_{\text{C}}} \kappa_{\text{L}}$$

where:

 $\frac{K_{C_{\overline{OF}}}}{MO1} \left(\frac{\overline{OF}}{q} \right) \psi_{\overline{ISO}} = \frac{\text{Initial side force slope prediction,}}{\frac{\text{ft}^2}{\text{deg.}}}, \text{ see Subsection 2.3.2.}$

K - Store spanwise position correction MSi factor, Figure 331.

- Correction factor based on the distance from the wing reading edge to the nose of the store on MER CTA 1 measured in a wing plan view rivided by the local wing chord, positive, Figure 354.

Correction factor based on pylon height divided by the local wing chord, Figure 333.

K. Wing sweep correction factor, $\frac{\sin \Lambda}{\sin h 5^{\circ}}$, where Λ is the quarter_chord sweep angle of aircraft wing.

MER STATION 2:

$$\frac{\left(\frac{SF}{q}\right)_{\alpha_{\text{PRED}}}}{\underset{\text{MS2}}{\text{MS2}}} = \underset{\text{MS2}}{\text{K}_{\text{C}}} \frac{\left(\frac{SF}{q}\right)_{\psi_{\text{ISO MS2}}} \underset{\text{MS2}}{\text{K}_{\eta}} \underset{\text{MS2}}{\text{K}_{\eta}}$$

where

$$K_{C_{SF}}$$
 $\frac{(SF)_{q}}{MS2}$ - Initial side force slope prediction, $\frac{rt^{2}}{deg.}$, see Subsection 2.3.2

- Store spanwise position correction MS2 factor, Figure 331.

 $K_{\Lambda_{1}}$ - Defined above.

MER STATIONS 3, 4, 5, 6 (MS3,5; MS4,6):

where

 $K_{C_{SF}}(\frac{SF}{q})_{\Psi_{ISO}}$ - Initial side force slope prediction, $\frac{ft^2}{\deg}$, see Subsection 2.3.2. MS1 initial prediction is used for MS3,5 while MS2 is combined with MS4,6.

- Incremental side force coefficient slope presented as a function of local chord, $\frac{1}{\deg}$.

MER STA 3 - Figure 334

MER STA 4 - Figure 335

MER STA 6 - Figure 335

Example: Compute the side force variation with angle of attack, $\left(\frac{SF}{q}\right)_{\alpha}$, for an M117 store on MER STATION 6 of a fully loaded MER on the A-7 center pylon at M = 0.5.

Required for Computation:

ed for Computation:

$$K_{C_{SF}} \left(\frac{SF}{q} \right) \psi_{ISO} = .111 \frac{ft^2}{deg}$$
, see example Subsection 2.3.2
MS2

$$SPA = 1200 \text{ in}^2$$
. Subsection 2.2.2

$$\left(\frac{\text{SF}}{\text{q}}\right)_{\psi_{\text{ISO}}} = .11^{\frac{1}{4}} \frac{\text{ft}^2}{\text{deg}}, \text{ Subsection 2.3.2}$$

$$K_{\Lambda_1} = \frac{\sin 35^{\circ}}{\sin 45^{\circ}} = .811$$

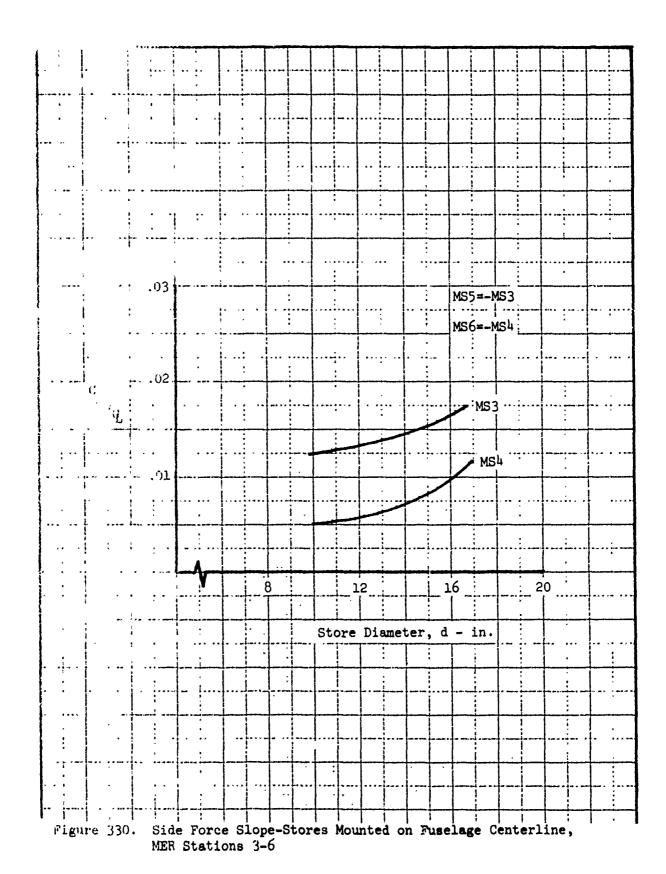
$$K_{\text{BCALE}_{\text{SF}}} = \frac{\left(\frac{\text{SF}}{\text{q}}\right)_{\alpha_{\text{ISO}}} \text{SPA}}{96}$$

$$\Delta C_{y_{\alpha_{MS6}}} = -.01 - Figure 335$$

then

$$\left(\frac{\text{SF}}{\text{q}}\right)_{\alpha_{\text{PRED}}} = [.111 + (-.01)\frac{(.114)(1200)}{96}].811$$

$$= .078 \frac{\text{ft}^2}{\text{deg}}$$



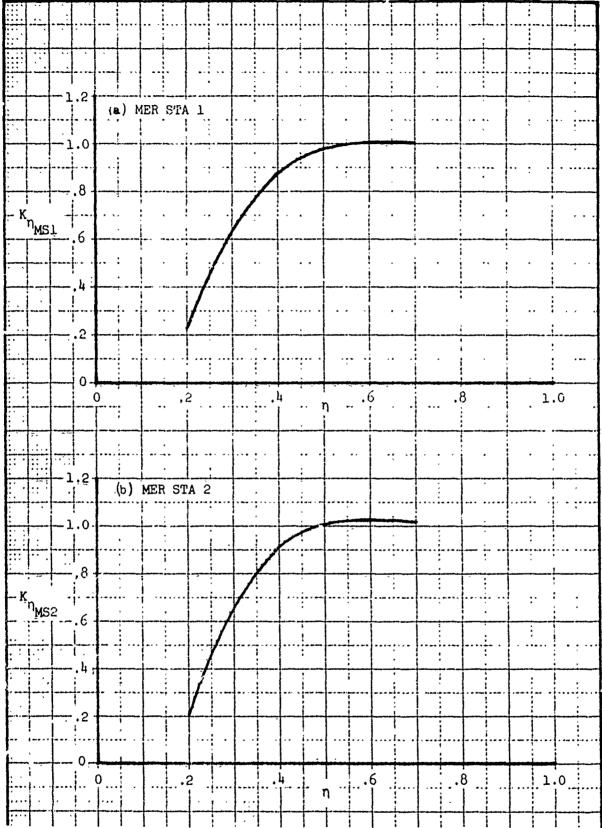


Figure 331. Side Force Slope - Spanwise Correction for MER Stations 1 and 2

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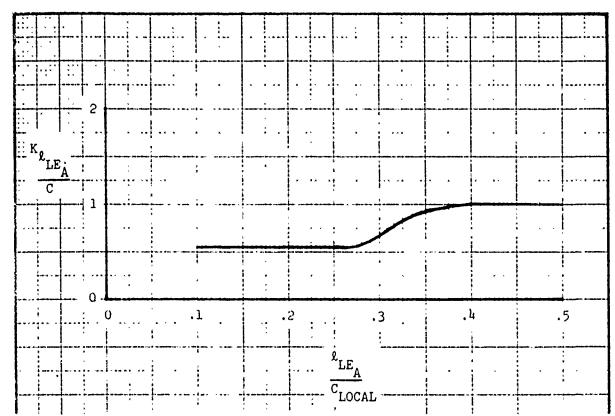


Figure 332. Side Force Slope - Chordwise Position Correction for

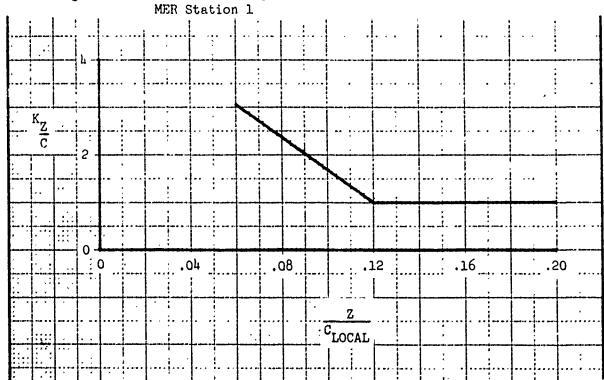


Figure 333. Side Force Slope - Pylon Height Correction for MER Station 1

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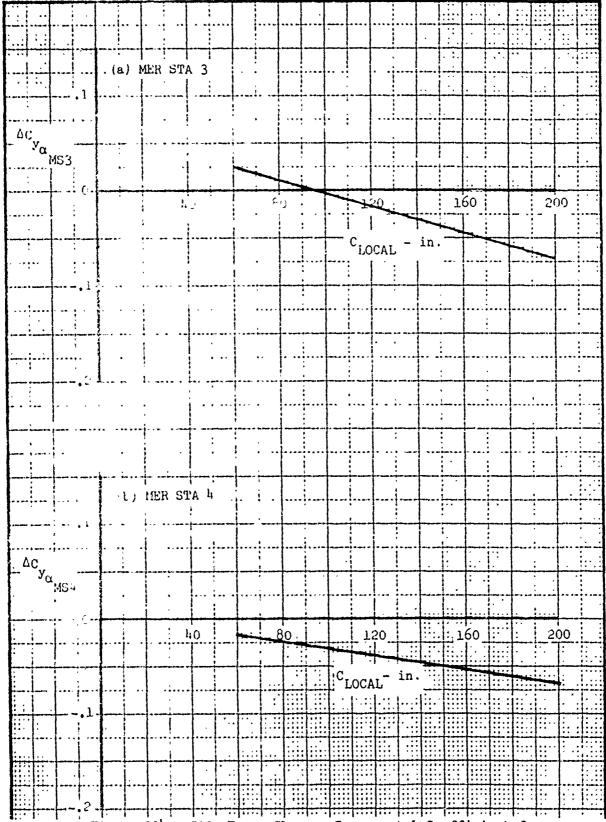


Figure 334. Side Force Slope - Incremental Coefficient for MER Stations 3 and 4

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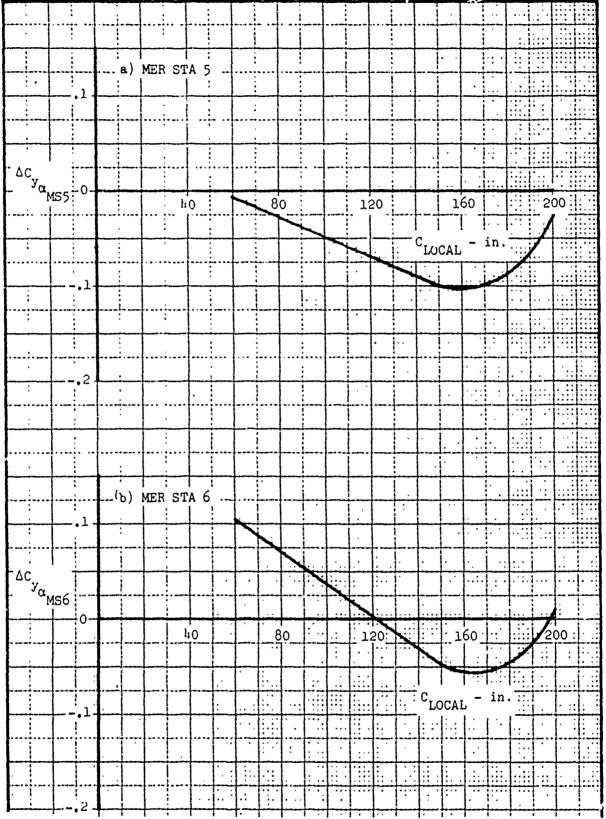


Figure 335. Side Force Slope - Incremental Coefficient for MER Stations 5 and 6

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4.1.1.2 Slope Mach Number Correction

To compute the variation in side force slope, $(\frac{SF}{q})_{\alpha}$, between M = 0.5 and M = 1.6, use the following expression.

$$\left(\frac{SF}{q}\right)_{\alpha}$$
 = $\left(\frac{SF}{q}\right)_{\alpha}$ + $\Delta\left(\frac{SF}{q}\right)_{\alpha}$
M = x PRED M = x

where:

 $\left(\frac{SF}{q}\right)_{\alpha}$ - Side force slope predicted at M = 0.5. PRED

 $\Delta \left(\frac{SF}{q}\right)_{\alpha} - \text{Increment in side force slope at } M = x.$

FUSELAGE CENTERLINE MOUNTED STORES

MER STATIONS 1 AND 2 (MS1,2):

$$\left(\frac{SF}{q}\right)_{\alpha}$$
 = 0, due to symmetry

M = x

MS1,2

MER STATIONS 3, 4, 5, 6 (MS3-6):

where:

 $\left(\frac{\text{SF}}{q}\right)_{\alpha}$ - Slope predicted for fuselage centerline stores at M = 0.5, Subsection 4.1.1.1.

- Incremental side force coefficient slope presented as a function of Mach number, Figure 337.

K_{SCALE_{SF}} - Defined in Section IV, ft².

WING MOUNTED STORES

A generalized curve depicting the side force slope variation with Mach number is given by Figure 336.

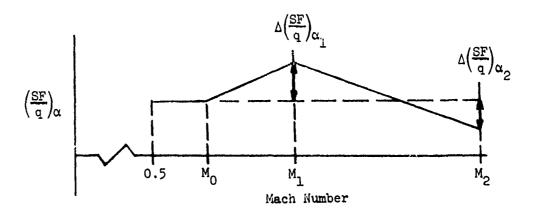


Figure 336. Side Force Slope - Generalized Mach Number Variation

The side force slope variation with Mach number has been approximated by a series of linear segments with breakpoints occurring at Mach numbers defined by M_0 , M_1 , and M_2 for each of the six MER stations. The variations of the Mach break points are presented in Figure 338 (MS1, 2), Figure 339 (MS4, 6), and Figure 3^{40} (MS3,5) as a function of $C_{LOCAL}K_{\Lambda_1}$. M_0 is the Mach number where the slope initially deviates from the slope predicted at M=0.5. Equations have been developed to predict the delta (incremental) slope change from that predicted at M=0.5 for each of the six MER stations. These equations are presented below

Break 1 (M₁):

MER STATION 1 (MS1):

$$\Delta \left(\frac{SF}{q}\right)_{C_{1_{MS1}}} = K_{SLOPE_{1_{MS1}}} (M_{1} - M_{0})K_{SCALE_{EF}}K_{1_{1}}$$

where:

 $^{K}_{\text{CLOPE}_{1}}$ - Variation of $^{\Delta C}_{y_{\alpha}}$ with Mach number presented as a function of semi-span position, $^{\eta}$, Figure 341.

 $M_1 - M_0$ - Delta Mach number

K_{SCALE} - Defined in Section IV, ft.²

K - Wing sweep correction factor, $\frac{\sin \Lambda}{\sin 45^{\circ}}$, is the quarter chord sweep angle of the aircraft wing.

MER STATIONS 2, 4 and 6 (MS2,4,6):

$$\Delta \left(\frac{\text{SF}}{q}\right)_{\alpha_{1}} = \left(K_{\text{SLOPE}_{1}} + \Delta K_{\text{SLOPE}_{1}}\right) \left(M_{1} - M_{0}\right).$$

$$MS2, 4, 6 \qquad \text{INTF} \\ MS2, 4, 6$$

$$\left(K_{\text{SCALE}_{SF}} K_{1}\right)$$

where: $K_{\rm SLOPE_1}$ - Variation of $C_{\rm y_{\alpha}}$ with Mach number presented as a function of $C_{\rm LOCAL}{}^{\rm K}{\Lambda_1}$, $\frac{1}{\rm deg}$.

MER STA 2 - Figure 341

MER STA 6 - Figure 343

 ΔK_{SLOPE_1} - Increment in K_{SLOPE_1} due to the interference INTF effect of the fuselage for high wing aircraft, $\frac{1}{\deg}$, Figure 342.

M, - M .. Defined under Break 1, MS1.

K_{SCALE</sup>GF - Defined in Section IV, ft².}

 K_{Λ_1} - Defined under Break 1, MS1

MER STATIONS 3 and 5 (MS3,5):

$$\Delta \left(\frac{\text{SF}}{q}\right)_{\alpha_{1}} = \Delta C_{y_{\alpha_{1}}} K_{\text{SCALE}_{\text{CF}}} K_{\Lambda_{1}}$$
MS3,5

where:

- Incremental Cypresented as a function of $\frac{C_{LOCAL}K_{\Lambda_1}, \frac{1}{\deg}}{\deg}$ MER STA 3 - Figure 3hh MER STA 5 - Figure 3hh

Break 2 (Mg):

MER STATIONS 1,2,4,6 (MS1,2,4,6):

$$\Delta \left(\frac{\text{SF}}{\text{q}}\right)_{\alpha_{2}} = \Delta \left(\frac{\text{SF}}{\text{q}}\right)_{\alpha_{1}} + \kappa_{\text{SLOPE}_{2}} \\ \text{MS1,2,4,6} & \text{MS1,2,4,6} & \text{MS1,2,4,6} \\ \left(\frac{\text{M}_{2} - \text{M}_{1}}{\text{MSCALE}_{\text{SF}}}\right)_{\kappa} \\ \kappa_{1} + \kappa_{1} + \kappa_{2} + \kappa_{3} + \kappa_{4} + \kappa_{3} + \kappa_{4} + \kappa_{5} + \kappa_$$

where:

 $^{K}_{SLOPE}_{2}$ - Variation of $^{\Delta C}_{y_{\alpha}}$ with Mach number presented as a function of $^{C}_{LOCAL}{}^{K}_{\Lambda_{1}}$, $\frac{1}{\deg}$.

MER STA 1 - Figure 345

MER STA 2 - Figure 345

MER STA 4 - Figure 346

MER STA 6 - Figure 346

M₂ - M₁ - Delta Mach number.

Commenter of the same section that the section is

 $K_{SCALE_{SF}}$ - Defined in Section TV, ft².

- Defined under Break 1, MS1.

MER STATIONS 3 and 5 (MS3,5):

$$\Delta \left(\frac{\exists F}{q}\right)_{\alpha_{2}} = \Delta \left(\frac{\exists F}{q}\right)_{\alpha_{1}} + \Delta C_{y_{\alpha_{2}}} K_{\text{CCALE}_{SF}} K_{1}$$
MS3,5
MS3,5

where:

 $\Delta \left(\frac{SF}{q}\right)_{\alpha_1} \quad \text{- Incremental side force slope computed under} \\ \quad \text{Break 1 for the appropriate MER station.}$

- Incremental C presented as a function of $\frac{^{C}_{V_{\alpha}}}{^{C}_{LOCAL}^{K}\Lambda_{1}}, \frac{1}{\deg}.$ MER STA 3 - Figure 3^{h} 7 MER STA 5 - Figure 3^{h} 7.

K_{SCALE</sup>SF - Defined in Section IV, ft².}

- Defined under Break 1, MS1.

To compute $\left(\frac{SF}{q}\right)_{\Omega}$ at M = x, first determine from Figures 338, 339, or 340 (for the MER station of interest) between which Mach number break points M = x occurs. Let M_{LOW} be the lower Mach break and M_{HI} be the higher Mach break. Compute $\left(\frac{SF}{q}\right)_{\Omega}$ at M = x from the expression below.

MER STATIONS 1 - 6 (MS1-6):

$$\frac{\left(\frac{\text{SF}}{\text{q}}\right)_{\alpha}}{\underset{\text{MS1-6}}{\text{M}} = x} = \frac{\left(\frac{\text{SF}}{\text{q}}\right)_{\alpha}}{\underset{\text{PRED}}{\text{PRED}}} + \Delta \left(\frac{\text{SF}}{\text{q}}\right)_{\alpha} + \left(\frac{x - M_{\text{LOW}}}{M_{\text{HI}} - M_{\text{LOW}}}\right) \left[\Delta \left(\frac{\text{SF}}{\text{q}}\right)_{\alpha} + \frac{M_{\text{EI}}}{M_{\text{SI-6}}}\right]$$

$$- \Delta \left(\frac{\text{SF}}{\text{q}}\right)_{\alpha}$$

$$M_{\text{LO}}, M_{\text{SI-6}}$$

If $x \leq M_0$, $\left(\frac{SF}{q}\right)_{\alpha}$ will be the value obtained in Subsection M = x 4.1.1.1 (the initial term in the above equation).

Example: Compute the side force variation with angle of attack, $\left(\frac{SF}{q}\right)_{\alpha}$, for an Mll7 store on MER STATION 6 of a fully loaded MER on the A-7 center pylon at M = 0.6.

Required for Computation:

$$C_{LOCAL} = 127.6 \text{ in.}$$

$$K_{\Lambda_1} = \frac{\sin 35^{\circ}}{\sin 45^{\circ}} = .811$$

$$K_{SCALE_{SF}} = \frac{\left(\frac{SF}{q}\right)\psi_{ISO}}{96}$$

$$\left(\frac{SF}{q}\right)\psi_{ISO} = .11^{4} \frac{ft^{2}}{deg}$$

$$SPA = 1200 \text{ in}^{2}.$$

$$\eta' = .352$$

$$\left(\frac{SF}{q}\right)_{\alpha} = .078 \frac{ft^{2}}{deg} \text{ from example Subsection 4.1.1.1.}$$

From Figure 339, M = 0.6 falls between $M_{\rm O}$ and $M_{\rm 1}$. Let $M_{\rm LOW}$ = 0.5 and $M_{\rm HI}$ = $M_{\rm 1}$ = 0.7.

at $M_{LOW}(M_0)$: $\Delta\left(\frac{SF}{q}\right)_{\Omega}=0$ (since M_0 is the Mach number where the M_{LOW} slope first deviates from that predicted MS6 at M=0.5).

Break 1 (M₁):

$$K_{\text{SLOPE}_{1}} = -.185 - \text{Figure } 3^{1/3}$$

then,

$$\Delta \left(\frac{\text{SF}}{q}\right)_{\alpha_{1}} = (-.185 + 0)(0.7 - 0.5)\frac{(.114)(1200)}{96}(.811)$$

$$MS6 = -.043 \frac{\text{ft}^{2}}{\text{deg}}$$

finally,

$$\left(\frac{\text{SF}}{q}\right)_{\alpha} = .078 + 0 + \left(\frac{0.6 - 0.5}{0.7 - 0.5}\right)[-.0h3 - 0]$$

$$M = 0.6 = .057 \frac{\text{ft}^2}{\text{deg}}$$

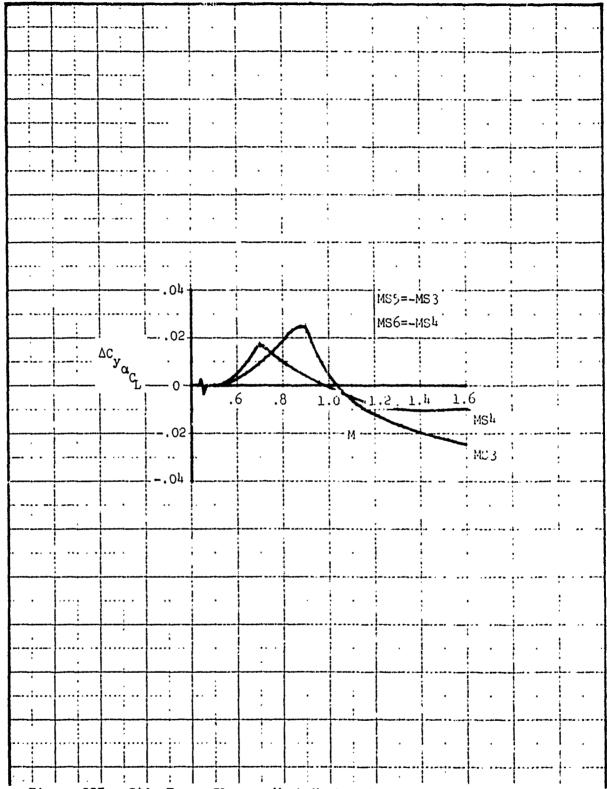


Figure 337. Side Force Slope - Mach Number Correction for Stores Mounted on Fuselage Centerline, MER Stations 3-6

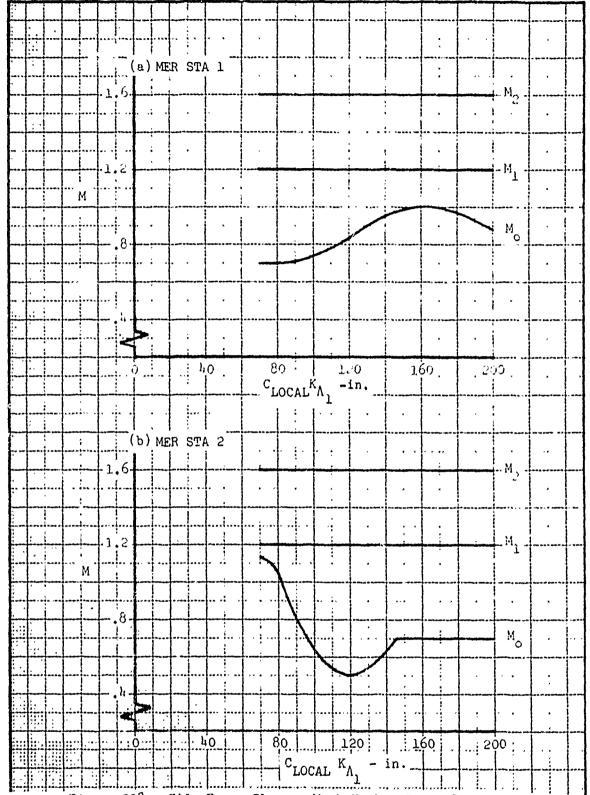


Figure 338. Side Force Slope - Mach Number Break Points for MER Stations 1 and 2

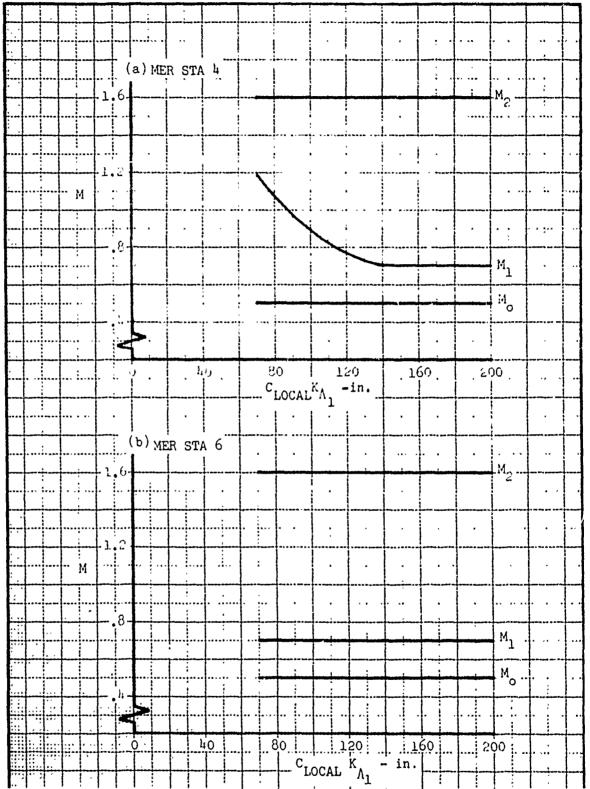


Figure 339. Side Force Slope - Mach Number Break Points for MER Stations 4 and 6

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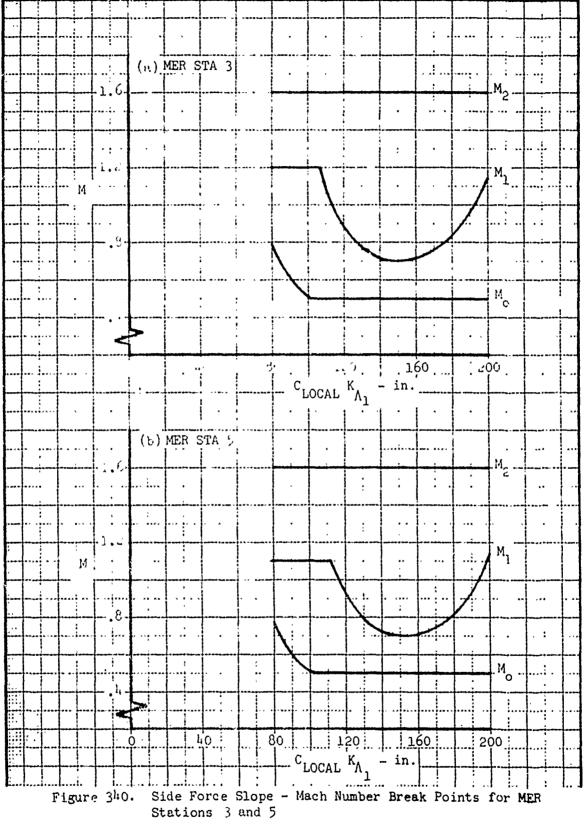
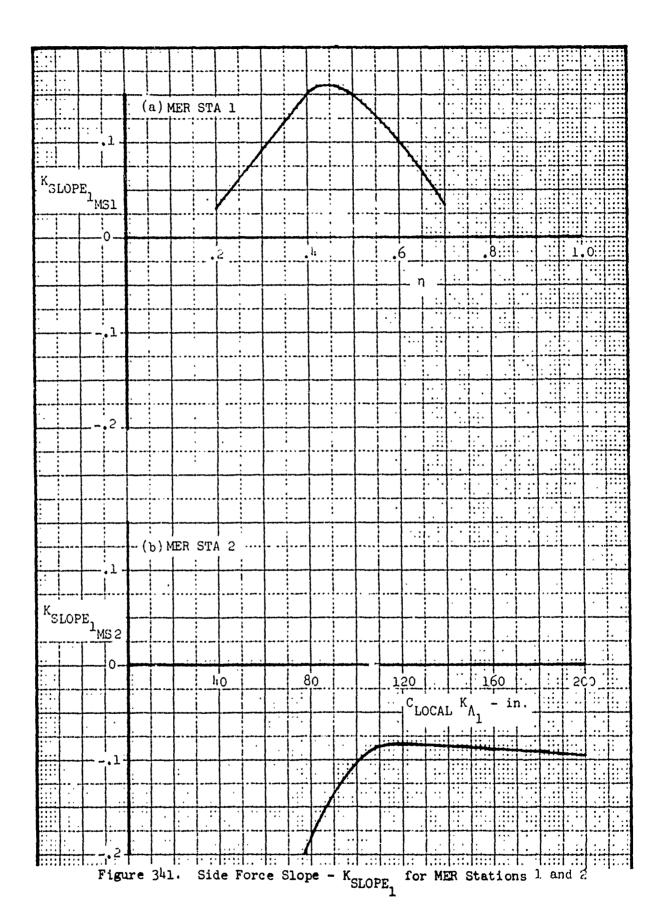


Figure 340.



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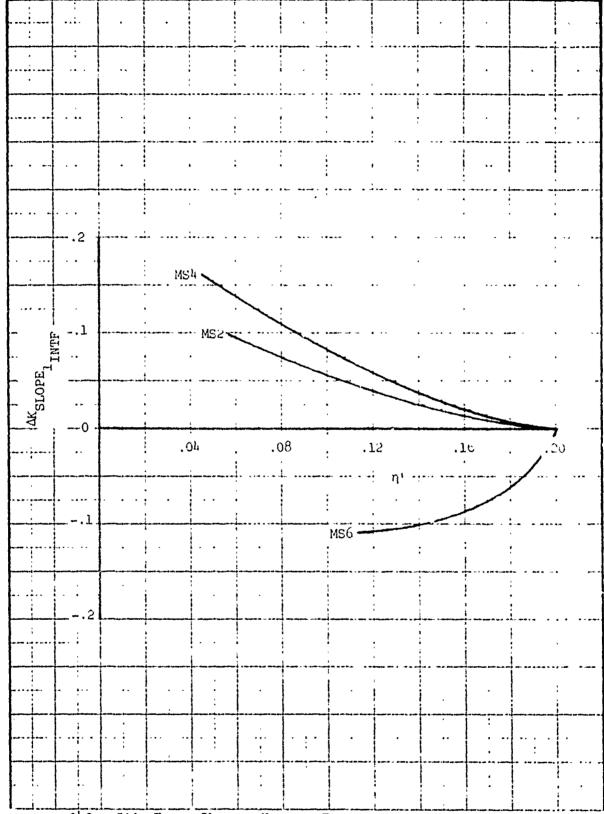
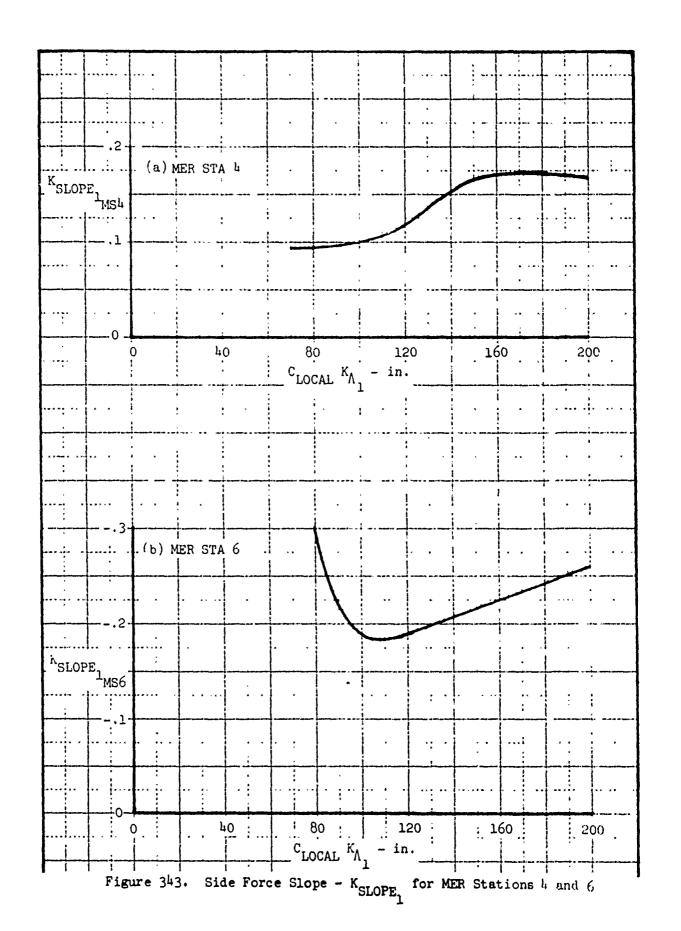


Figure 342. Side Force Slope - K_{SLOPE} Fuselage Interference Correction for MER Stations 2,4 and 6



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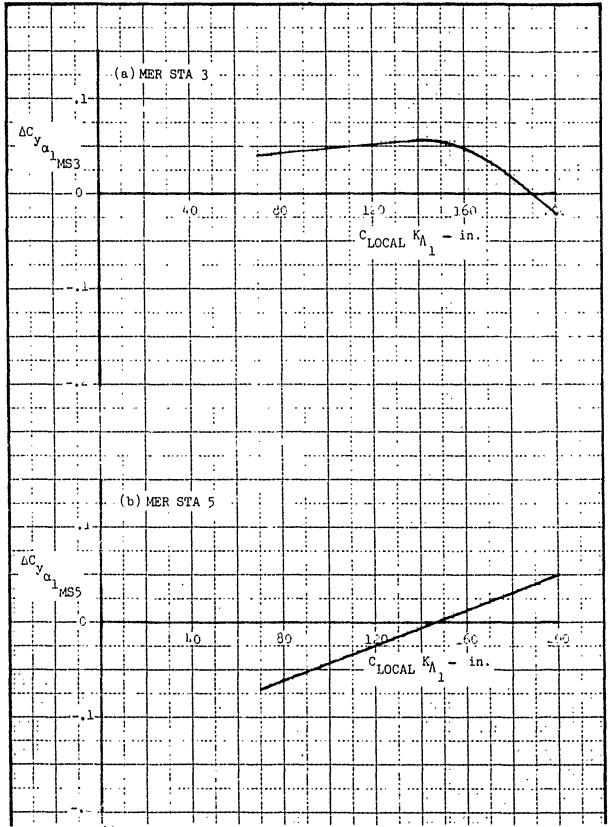
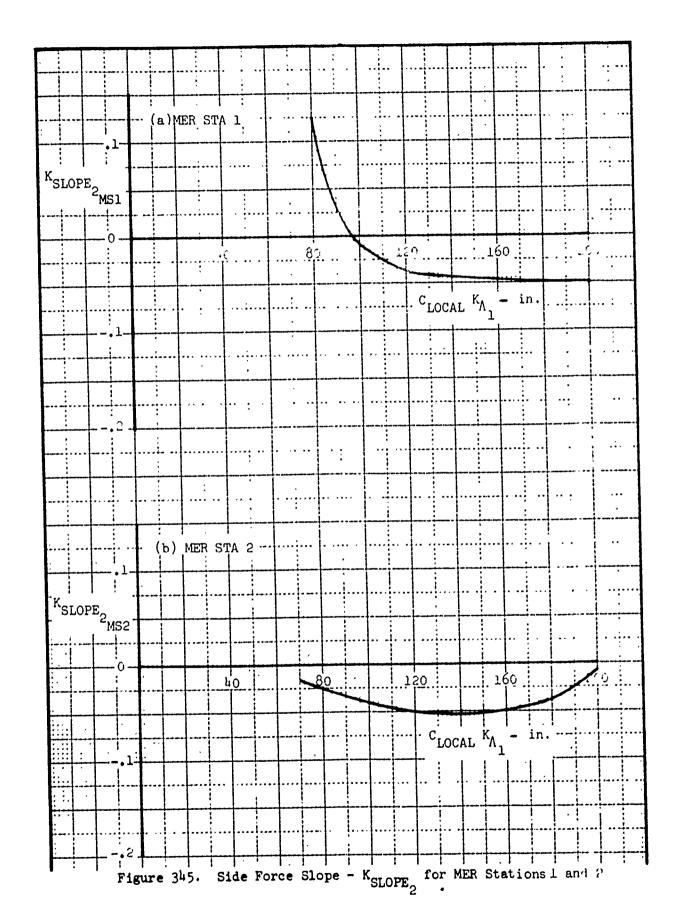
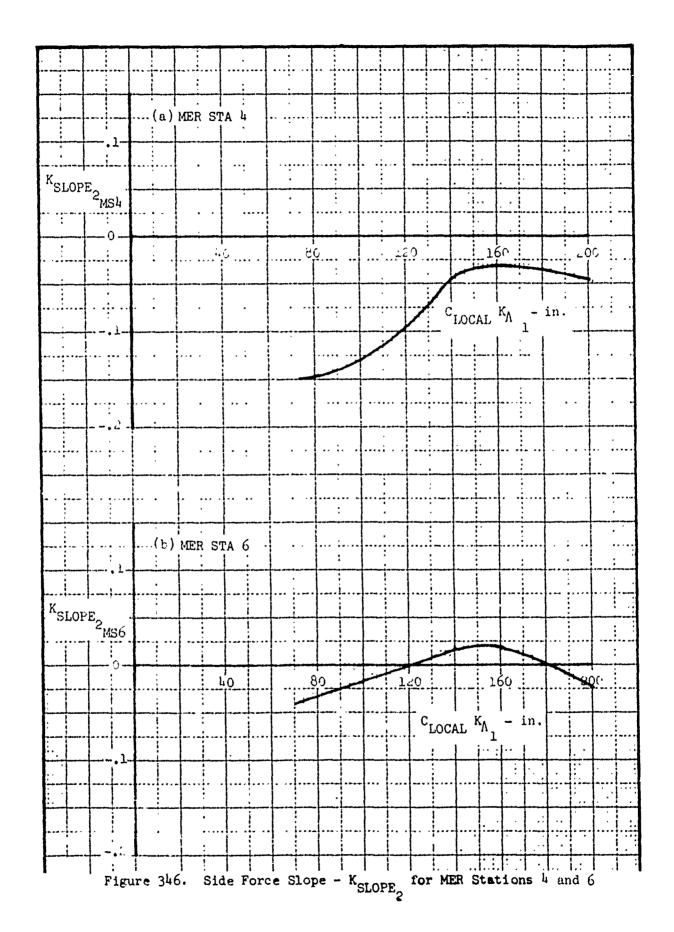


Figure 344. Side Force Slope - Incremental Coefficient at Mach Break 1 for MER Stations 3 and 5

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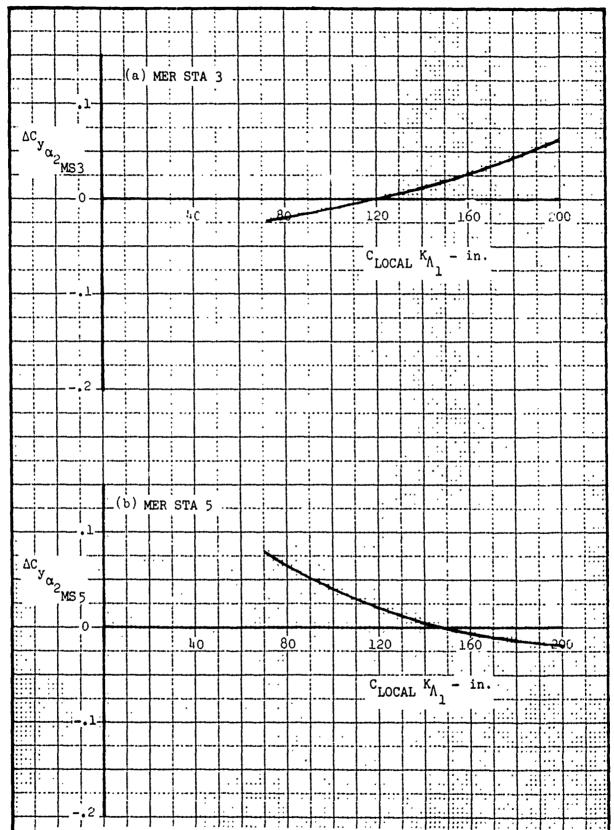


Figure 347. Side Force Slope - Incremental Coefficient at Mach Break 2 for MER Stations 3 and 5

a commendate up along some stage stage sugar and

4.1.1.3 Intercept Prediction

The prediction of captive store side force intercept,

 $\left(\frac{SF}{q}\right)_{\alpha=0}$, is divided into two sections, fuselage centerline-mounted stores and wing-mounted stores. The technique presented in this section predicts the side force intercept, $\left(\frac{SF}{q}\right)_{\alpha=0}$, at M = 0.5.

FUSELAGE CENTERLINE-MOUNTED STORES

MER STATIONS 1 and 2 (MS1,2):

$$\left(\frac{\text{SF}}{q}\right)_{u=0}$$
 = 0, due to symmetry

PRED

MS1,2

MER STATIONS 3,4,5, and 6 (MS3-6):

where:

 $c_{y_{\alpha=0}}$ - Variation of $c_{y_{\alpha=0}}$ presented as a function of store diameter, Figure 348.

 S_{REF} - Store reference, $\frac{\pi d^2}{4}$, ft^2 .

WING-MOUNTED STORES

MER STATIONS 1 and 2 (MS1,2):

$$\frac{\left(\frac{SF}{q}\right)_{\alpha=0}}{\underset{MS1,2}{\text{FRED}}} = C_{y_{\alpha=0}} K_{\text{SCALE}_{SF}} K_{\lambda_{1}}$$

where:

 $C_{y_{\alpha=0}}$ - Variation of $C_{y_{\alpha=0}}$ presented as a function of $C_{LOCAL}K_{\Lambda_1}$ MER STA 1 - Figure 349

MER STA 2 - Figure 349

 $K_{\text{SCALE}_{\text{SF}}}$ - Defined in Section IV, ft².

 K_{Λ_1} - Wing sweep correction factor, $\frac{\sin \Lambda}{\sin 45^{\circ}}$, where Λ is the aircraft quarter-chord wing sweep angle.

MER STATIONS 4 and 6 (MS4,6):

$$\frac{\left(\frac{\text{SF}}{q}\right)_{\alpha=0}}{\underset{\text{MS4,6}}{\text{PRED}}} = \frac{\left(\frac{\text{SF}}{q}\right)_{\alpha=0}}{\underset{\text{PRED}}{\text{PRED}}} + \Delta C_{y_{\alpha=0}} K_{\text{SCALE}_{SF}} K_{1}$$

where

 $\left(\frac{SF}{q}\right)_{\alpha=0}$ - Value predicted for fuselage centerline-PRED mounted stores, defined above, ft?.

 $\begin{array}{c} \Delta C_{y_{\alpha=0}} & - \text{ Variation of } C_{y_{\alpha=0}} & \text{based on} \frac{\ell_{LE_F}}{C_{LOCAL}} \text{ defined} \\ & \text{as the distance from the wing leading edge} \\ & \text{to the nose of the store on MER STA 2 measured} \\ & \text{in a wing plan view divided by the local} \\ & \text{wing chord, positive, Figure 350.} \end{array}$

K_{SCALE</sup>SF - Defined in Section IV, ft².}

K_A - Defined above.

MER STATIONS 3 and 5 (MS3,5):

$$\frac{\left(\frac{SF}{q}\right)_{\alpha=0}}{PRFD} = \frac{\left(\frac{SF}{q}\right)_{\alpha=0}}{PRED} + AC_{y_{\alpha=0}} \\ PRED_{c} \\ MS3,5$$

$$+ AC_{y_{\alpha=0}} \\ MS3,5$$

$$+ AC_{y_{\alpha=0}} \\ MS3,5$$

wi:ere:

$$\left(\frac{SF}{q}\right)_{\alpha=0}$$
 - Value predicted for fuselage centerline-PRED mounted stores, defined above, ft².

Example: Compute the side force intercept, $\left(\frac{SF}{q}\right)_{\alpha=0}$, for an M117 store on MER STATION 6 of a fully loaded MER on the 4-7 center pylon at M = 0.5.

Required for Computation:

$$C_{LOCAL} = 127.6 \text{ in.}$$

$$l_{LE}_{F} = 59.3 \text{ in.}$$

$$d = 16.1 \text{ in.}$$

$$S_{REF} = 1.42 \text{ ft}^{2}.$$

$$\left(\frac{SF}{q}\right)_{\Psi_{\overline{1}SO}} = .114 \frac{\text{ft}^{2}}{\text{deg}}$$

$$SPA = 1200 \text{ in}^{2}.$$

$$K_{\Lambda_{\overline{1}}} = \frac{\sin 35^{\circ}}{\sin 15^{\circ}} = .811$$

then

$$\left(\frac{SF}{q}\right)_{\alpha=0}$$
 = (.174)(1.42) = .247 ft².

PRED E MS6

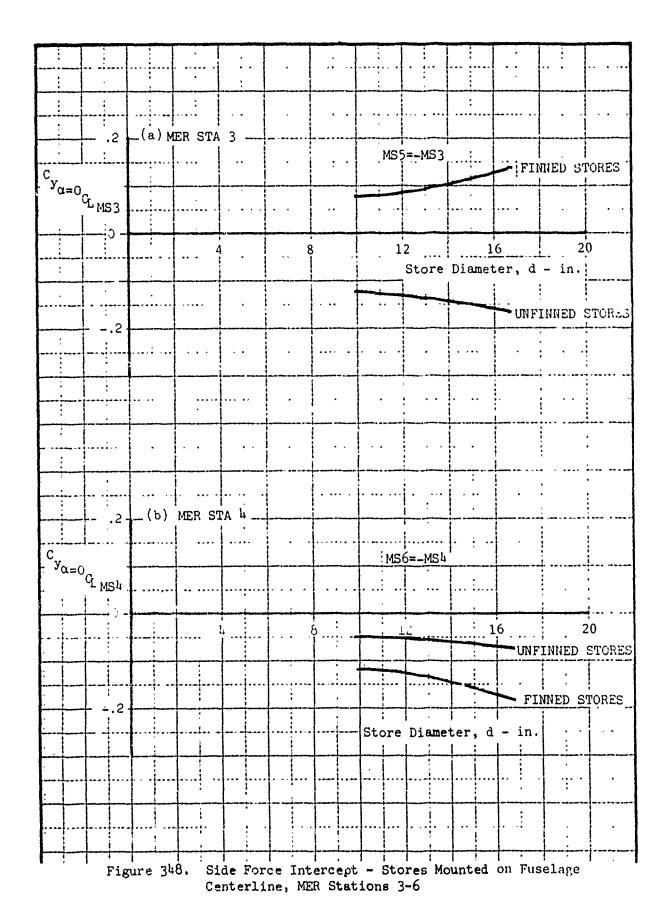
$$\Delta C_{y_{\alpha=0}} = -.23 - \text{Figure } 350$$
MS6

Substituting,

$$\left(\frac{\text{SF}}{q}\right)_{\alpha=0} = .247 + (-.23)\frac{(.114)(1200)}{96}(.811)$$

PRED

MS6 = -.019 ft².



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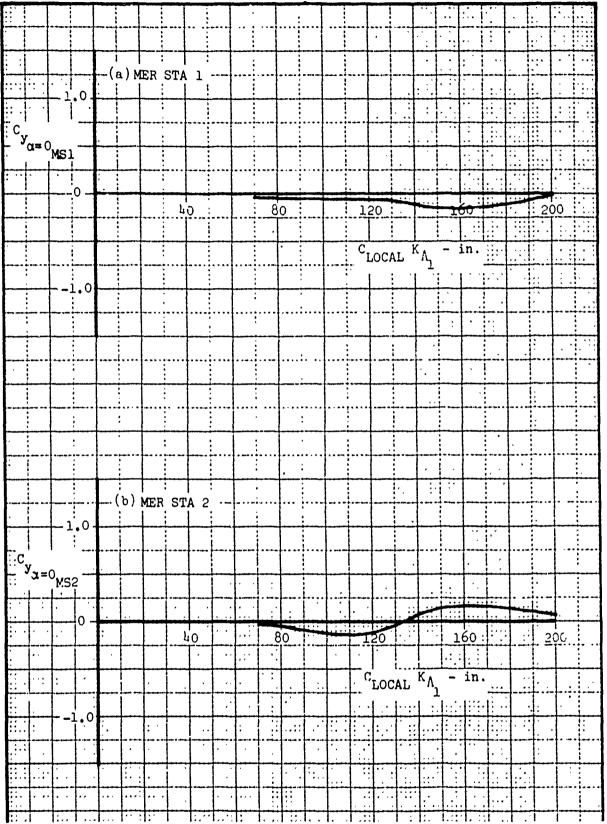


Figure 349. Side Force Intercept - Incremental Coefficient for Wing-Mounted Stores, MER Stations 1 and 2

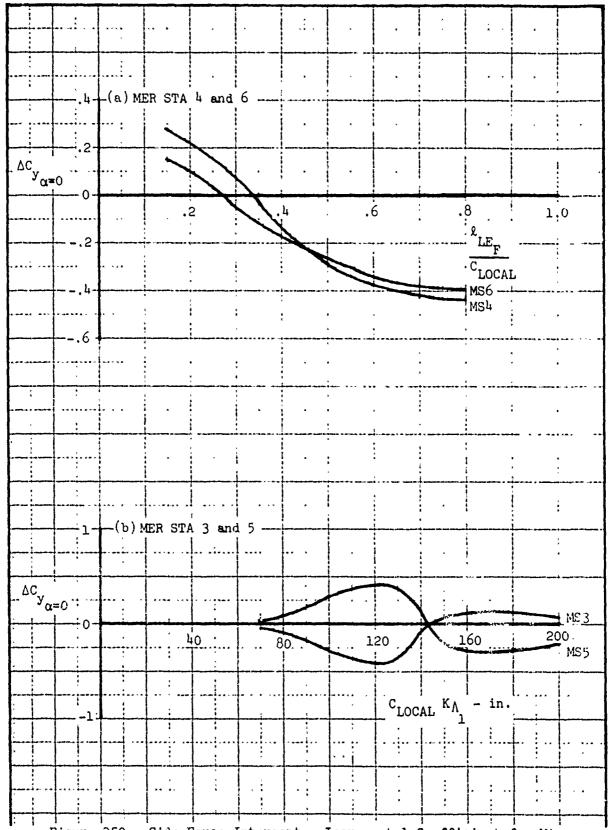


Figure 350. Side Force Intercept - Incremental Coefficient for Wing-Mounted Stores, MER Stations 3-6

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4.1.1.4 Intercept Mach Number Correction

To compute the variation in side force intercept. $\left(\frac{SF}{q}\right)_{\alpha=0}$, between M = 0.5 and M = 1.6 use the following expression.

$$\left(\frac{SF}{q}\right)_{\alpha=0} = \left(\frac{SF}{q}\right)_{\alpha=0} + \Delta\left(\frac{SF}{q}\right)_{\alpha=0}$$

$$M = x \qquad PRED \qquad M = x$$

where:

$$\left(\frac{SF}{q}\right)_{\alpha=0}$$
 - Side force intercept predicted at M = 0.5. PRED

$$\Delta \left(\frac{SF}{q}\right)_{\alpha=0} - \text{Increment in side force intercept at } M = x.$$

$$M = x$$

FUSELAGE CENTERLINE-MOUNTED STORES

MER STATIONS 1 and 2 (MS1,2):

$$\frac{\left(\frac{SF}{q}\right)_{\alpha=0}}{e} = 0, \text{ due to symmetry}$$

$$M = x$$

$$MS1,2$$

MER STATIONS 3,4, 5 and 6 (MS3-6):

where:

$$\left(\frac{\text{SF}}{\text{q}}\right)_{\alpha=0}$$
 - Intercept predicted for fuseloge centerline stores at M = 0.5, Subsection h.1.1.3.

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 $^{\Lambda C}y_{\alpha=0}$ - Incremental side force intercept presented as a function of Mach number, Figure 351.

K_{SCALF_{3F}} - Defined in Jection IV, ft².

WING-MOUNTED STORES

A generalized curve depicting the side force intercept variation with Mach number is given by Figure 201.

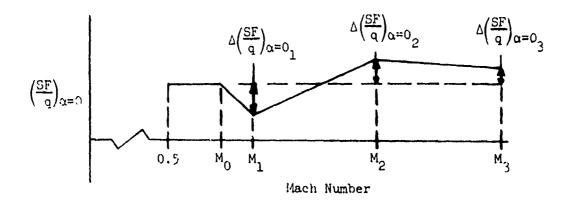


Figure 351. Side Force Intercept - Generalized Mach Number Variation

The side force intercept variation with Mach number has been approximated by a series of linear segments with break points occurring at Mach numbers defined by M_0 , M_1 , M_2 , and M_3 for each of the six MER stations. The variations of the Mach break points are presented in Figure 353 (MS1, 2), Figure 354 (MS4,6), and Figure 355 (MS3,5) as a function of $C_{LOCAL}K_{\Lambda_1}$. M_0 is the Mach number where the intercept initially deviates from the intercept predicted at M=2.5. Equations have been developed to predict the delta (incremental) slope change from that predicted at M=0.5 for each of the six MER stations. These equations are presented below.

Break 1 (M,):

MER STATION 1 (MS1):

ON 1 (MS1):

$$\Delta \left(\frac{SF}{q}\right)_{\alpha=0} = (\Delta C_{y_{\alpha=0}} + \Delta C_{y_{\alpha=0}} + \Delta C_{y_{\alpha=0}} + \Delta C_{y_{\alpha=0}}) K_{SCALE} K_{A_1}$$

$$MS1 \qquad MS1 \qquad LE_F \qquad INTF MS1$$

where

- Increment in C based on the distance from the Wing leading edge to the nose of the store on MER STA 2 measured in a wing plan view divided by the local wing chors, positive, Figure 357.

 $^{\Delta C}y_{\alpha=0}$ - Incremental C $_{y_{\dot{\alpha}=0}}$ due to the interference effect of the fuselage for high wing aircraft, INTF Figure 353.

 $^{\rm K}$ SCALE $_{\rm SF}$ - Defined in Section IV, ft2.

- Wing sweep correction factor, $\frac{\sin \Lambda}{\sin 45^{\circ}}$, where $^{K}\Lambda_{1}$ Λ is the quarter chord sweep angle of the aircraft wing.

MER STATIONS 2,3,4, and 5 (MS2-5):

$$\angle \left(\frac{SF}{q}\right)_{\alpha=0} = \Delta C_{y_{\alpha=0}} K_{SCALE_{SF}} K_{1}$$

$$MS2-5 MS2-5$$

where:

 $K_{SCALF_{SF}}$ - Defined in Section IV, ft².

 $K_{\Lambda_{\gamma}}$ - Defined above

MER STATION 6 (MS6):

$$L\left(\frac{SF}{q}\right)_{\alpha=0} = (LC_{y_{\alpha=0}} + LC_{y_{\alpha=0}})K_{SCALE_{SF}}K_{1}$$

$$MS6 \qquad MS6 \qquad MS6$$

where:

 $y_{\alpha=0}$ - Incremental C due to the interference $y_{\alpha=0}$ effect of the fuselage for high wing aircraft, Figure 361.

K_{CCALE</sup>_{SF} - Defined in Section IV, ft².}

 K_{Λ_1} - Defined above.

Break 2 (M₂):

MER STATIONS 1,2,3, and 5 (MS1,2.3,5):

$$\Delta \left(\frac{\text{SF}}{\text{q}}\right)_{\alpha=0} = (\Delta c_{y_{\alpha=0}_{2}} + \Delta c_{y_{\alpha=0}_{2}} \\ \text{MS1,2,3,5} + \Delta c_{y_{\alpha=0}_{2}} \\ \text{MS1,2,3,5} + \Delta c_{y_{\alpha=0}_{2}}) K_{\text{SCALE}} \\ \frac{\ell_{\text{LE}_{r}}}{c} \\ \text{MS1,2,3,5}$$

where:

MER STA 2 - Figure 362

MER STA 3 - Figure 365

MER STA 5 - Figure 365

$$y_{\alpha=0}$$
 - Incremental C due to the interference effect of the fuselage for high wing aircraft.

MER STA 1 - Figure 364

MER STA 2 - Figure 364

MER STA 3 - Figure 367

MER STA 5 - Figure 367

ΔC - Incremental C based on the distance
$$y_{\alpha=0}$$
 from the wing leading edge to the nose of the store on MER STA 2 measured in a wing plan

view divided by the wing local chord, positive.

MER STA 1 - Figure 303

MER STA 2 - Figure 363

MER STA 3 - Figure 366

MER STA 5 - Figure 36t

KSCALE_{SF} - Defined in Section IV, ft².

- Defined under Break 1, MC1.

MER STATION: 4 and 6 (MS4,6):

$$\Delta \left(\frac{\text{SF}}{q}\right)_{\alpha=0} = \Delta C_{y_{\alpha=0}} K_{\text{SCALE}_{SF}} K_{1}$$

$$MS4, \epsilon$$

$$MS4, \epsilon$$

where:

 $\begin{array}{ll} \Delta C_{y_{\alpha=0}} & - \text{Incremental } C_{y_{\alpha=0}} \text{ at } M = M_{p}, \text{ presented as } \alpha \\ & \text{function of } C_{\text{LOCAL}} K_{h_{1}} \end{array}$

MER STA 4 - Figure 368

MER STA 6 - Figure 308

KSCALE_{SF} - Defined in Section IV, ft².

- Defined under Break 1, MS1.

BREAK 3 (M₃):

MER STATION (MS1):

No break 3

MER STATION 2 (MS2):

$$\Delta \left(\frac{\text{SF}}{q}\right)_{\alpha=0}_{3} = (\Delta C_{y_{\alpha=0}_{3}} + \Delta C_{y_{\alpha=0}_{3}} + \Delta C_{y_{\alpha=0}_{3}} + \Delta C_{y_{\alpha=0}_{3}} \times \frac{\lambda C_{y_{\alpha=0}_{3}}}{\text{MS2}} \times \frac{\lambda C_{y_{\alpha$$

where:

$$\Delta C_{y_{\alpha=0}_3}$$
 = Incremental $C_{y_{\alpha=0}}$ at M = M₃ presented as a function of $C_{x_{\alpha=0}}$. Figure 369.

- Incremental C due to the interference $y_{\alpha=0}^{3}$ effect of the fuselage for high wing aircraft, Figure 371.

Increment in C based on the distance $y_{\alpha=0}$ from the wing leading edge to the nose of the store on MER STA 2 measured in a wing plan view divided by the local wing chord, positive, Figure 370.

MER STATIONS 4 and 6 (MS4,6):

$$\Delta \left(\frac{\text{SF}}{q}\right)_{\alpha=0}_{3} = \Delta C_{y_{\alpha=0}_{3}}^{K_{\text{SCALE}_{\text{SF}}}} \Lambda_{1}$$
MS4,6
MS4,6

where:

$$\alpha c_{y_{\alpha=0}_3}$$
 - Incremental $c_{y_{\alpha=0}}$ at M = M₃ presented as a function of $c_{LOCAL}K_{\Lambda_1}$.

MER STA 4 - Figure 372 MER STA 6 - Figure 372 MER STATIONS 3 and 5 (MS3,5):

$$\Delta \left(\frac{\text{SF}}{\text{q}}\right)_{\alpha=0_3} = (\Delta C_{y_{\alpha=0_3}} + \Delta C_{y_{\alpha=0_3}})^{K_{\text{SCALE}}}_{\text{SF}}^{K} \Lambda_1$$
MS3.5

MS3.5

where:

- Incremental
$$C_{y_{\alpha=0}}$$
 at M = M₃ presented as a function of $C_{LOCAL}K_{\Lambda_1}$.

MER STA 3 - Figure 373

MER STA 5 - Figure 373

To compute $\left(\frac{SF}{q}\right)_{\alpha=0}$ at M = x, first determine from Figures 353, 354, or 355 (for the MER station of interest) between which Mach number break points M = x occurs. Let M_{LOW} be the lower Mach break and M_{HI} be the higher Mach break. Compute $\left(\frac{SF}{q}\right)_{\alpha=0}$ at M = x from the expression below.

MER STATIONS 1 - 6 (MS1-6):

$$\frac{\left(\frac{SF}{q}\right)_{\alpha=0}}{\underset{MS1-6}{\text{M}=x}} = \frac{\left(\frac{SF}{q}\right)_{\alpha=0}}{\underset{MS1-6}{\text{MS1-6}}} + \Delta \left(\frac{SF}{q}\right)_{\alpha=0} + \left(\frac{x - M_{LOW}}{M_{HI} - M_{LOW}}\right) \left(\Delta \left(\frac{SF}{q}\right)_{\alpha=0} \right)$$

$$\frac{M_{HI}}{MS1-6}$$

$$- \Delta \left(\frac{SF}{q}\right)_{\alpha=0} \right)$$

$$M_{LOW}$$

$$MS1-6$$

If $x \le M_0$, $\left(\frac{SF}{q}\right)_{\alpha=0}$ will be the value obtained in Subsection 4.1.1.3 (the M=x

initial term in the above equation).

An example illustrating the application of the above equation is found in subsection 4.1.1.2.

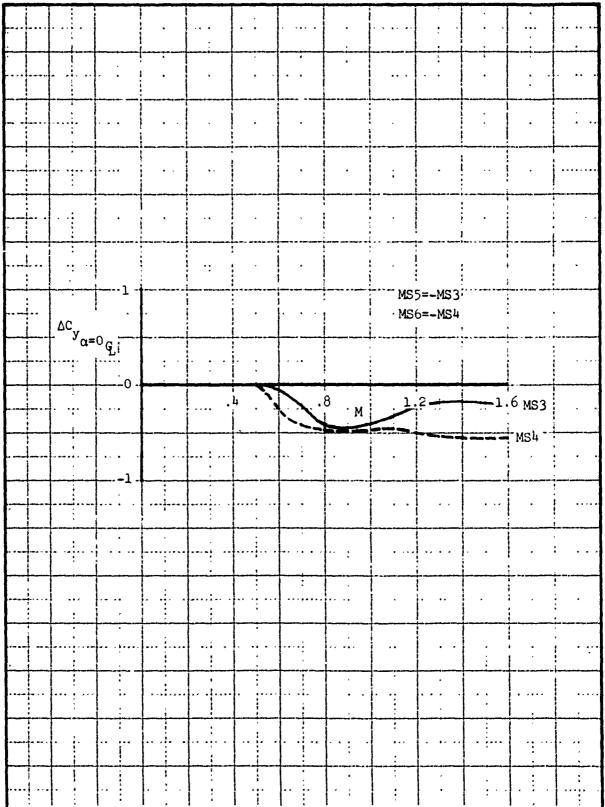


Figure 352. Side Force Intercept - Incremental Coefficient for Fuselage Centerline-Mounted Stores, MER Stations 3-6

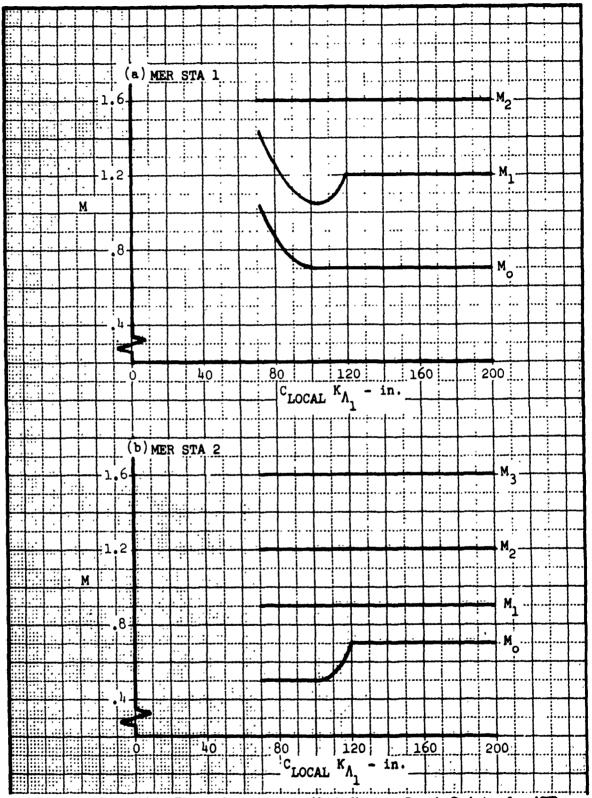


Figure 353. Side Force Intercept - Mach Number Break Points for MER Stations 1 and 2

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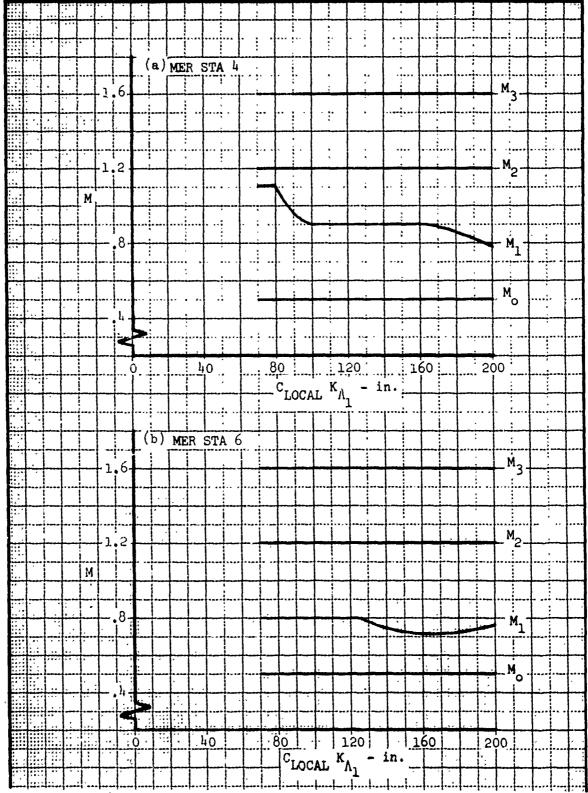
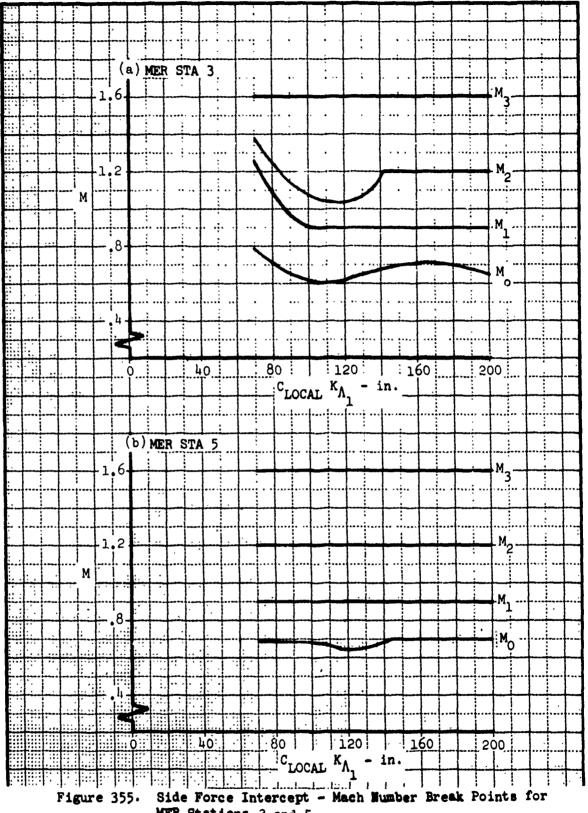


Figure 354. Side Force Intercept - Mach Number Break Points for MER

Stations 4 and 6

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MER Stations 3 and 5

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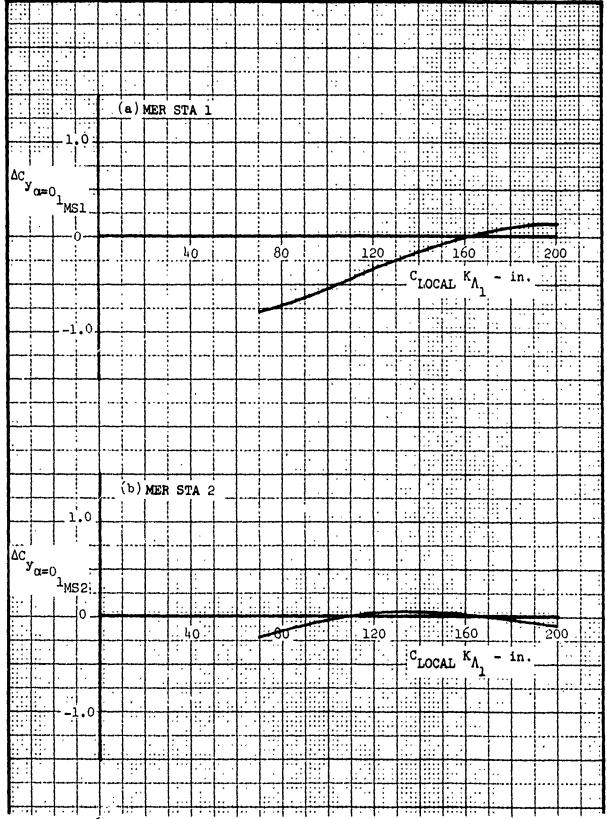


Figure 356. Side Force Intercept - Incremental Coefficient at Mach Break 1 for MER Stations 1 and 2

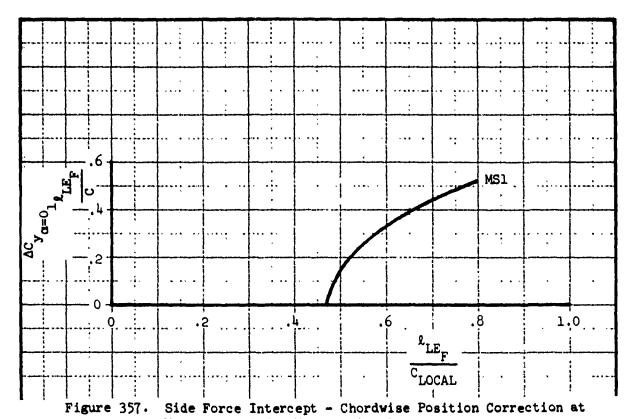


Figure 358. Side Force Intercept - Fuselage Interference Correction at Mach Break 1 for MER Station 1

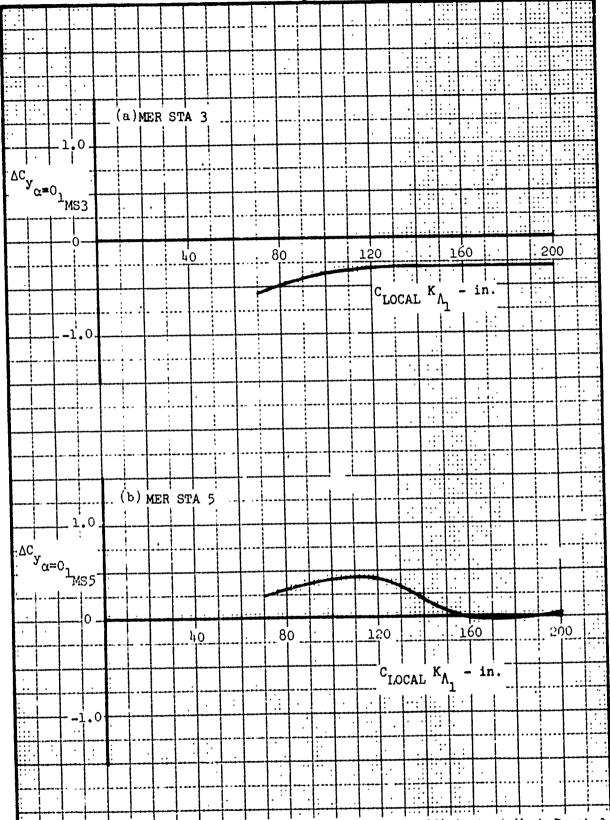


Figure 359. Side Force Intercept - Incremental Coefficient at Mach Break 1 for MER Stations 3 and 5

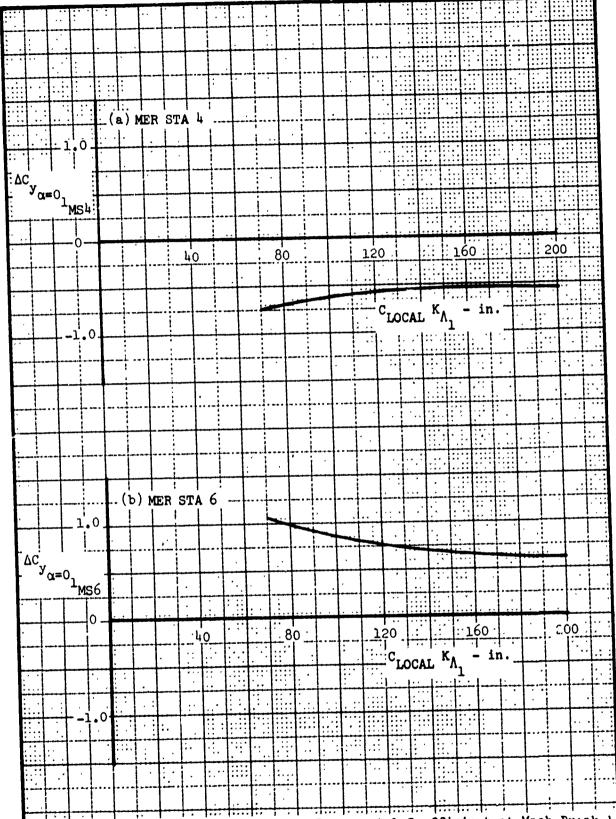


Figure 360. Side Force Intercept - Incremental Coefficient at Mach Break 1 for MER Stations 4 and 6

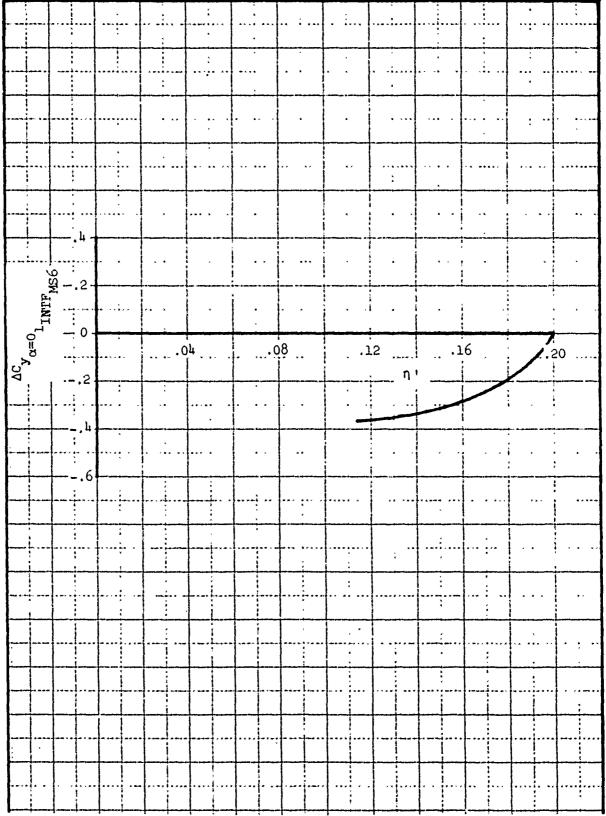


Figure 361. Side Force Intercept - Fuselage Interference Correction at Mach Break 1 for MER Station 6

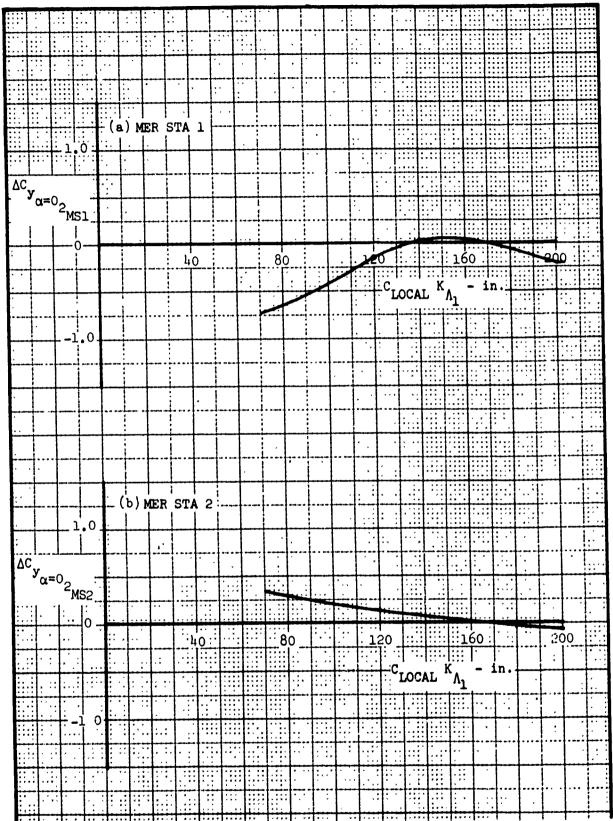


Figure 362. Side Force Intercept - Incremental Coefficient at Mach Break 2 for MER Stations 1 and 2

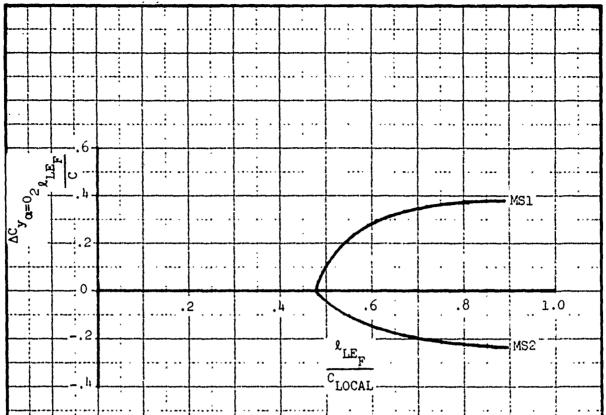


Figure 364. Side Force Intercept - Fuselage Interference Correction at Mach Break 2 for MER Stations 1 and 2

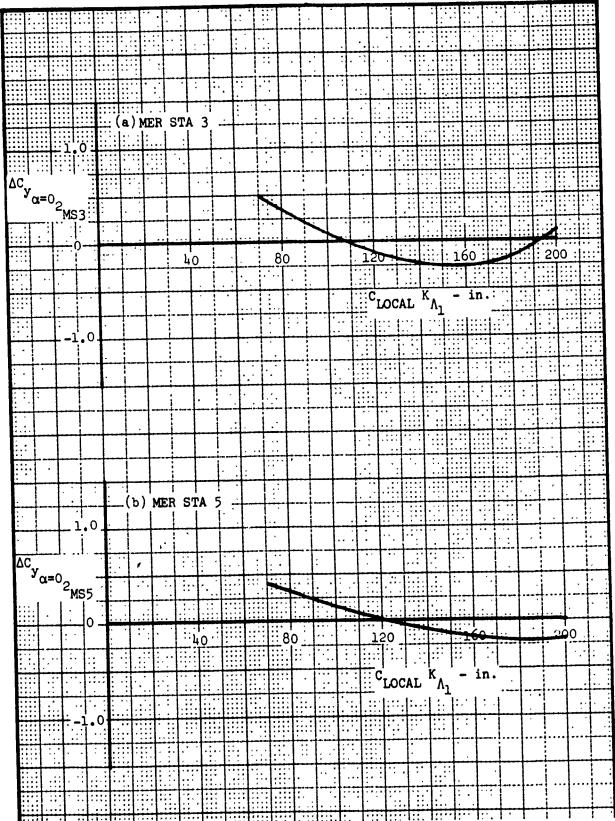
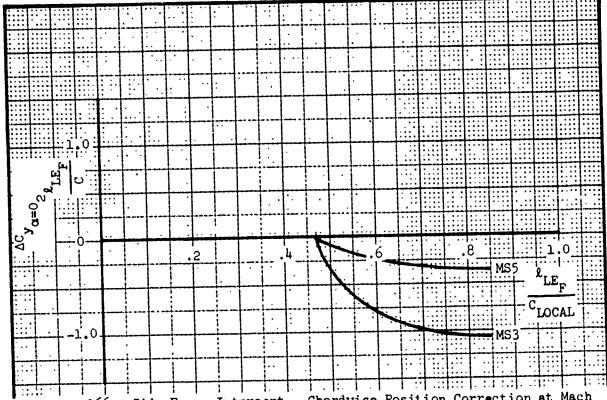
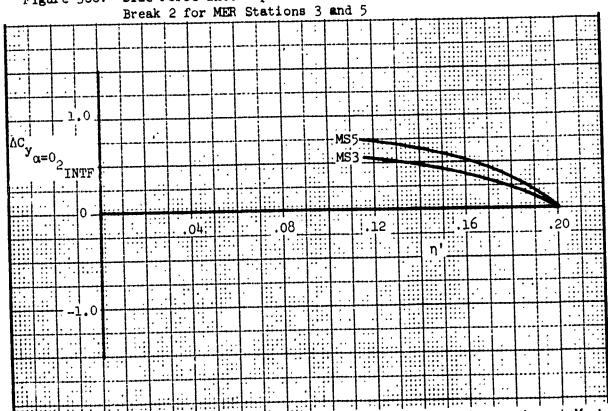


Figure 365. Side Force Intercept - Incremental Coefficient at Mach Break 2 for MER Stations 3 and 5



Side Force Intercept - Chordwise Position Correction at Mach Figure 366.



Side Force Intercept - Fuselage Interference Correction at Mach Figure 367. Break 2 for MER Stations 3 and 5

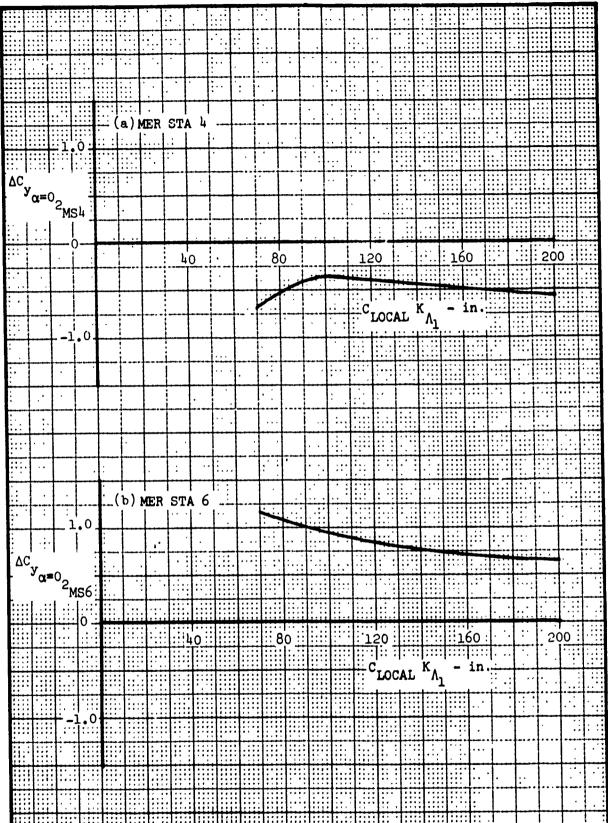


Figure 368. Side Force Intercept - Incremental Coefficient at Mach Break 2 for MER Stations 4 and 6

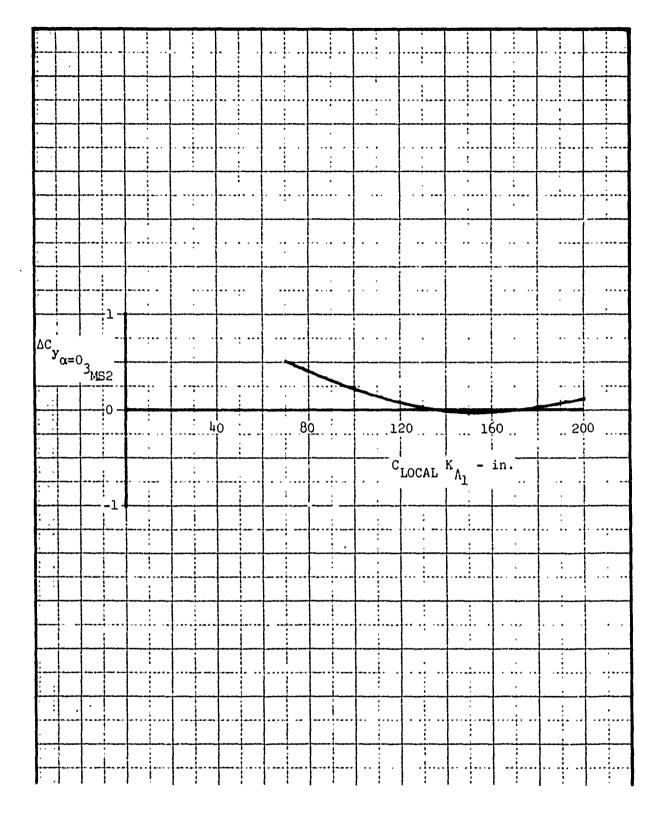


Figure 369. Side Force Intercept - Incremental Coefficient at Mach Break 3 for MER Station 2

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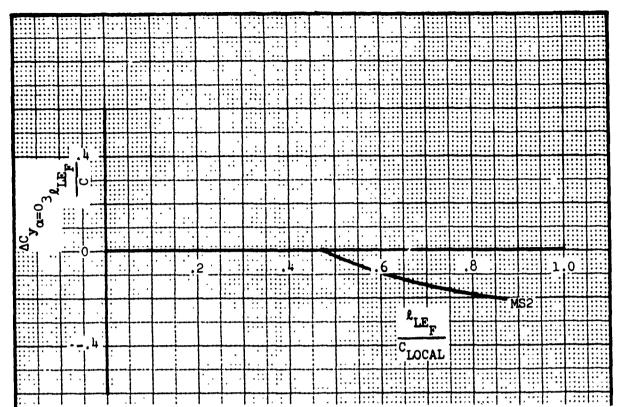


Figure 370. Side Force Intercept - Chordwise Position Correction at Mach Break 3 for MER Station 2

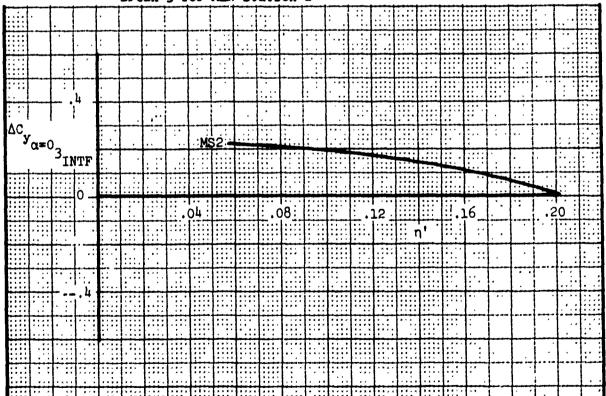


Figure 371. Side Force Intercept - Fuselage Interference Correction at Mach Break 3 for MER Station 2

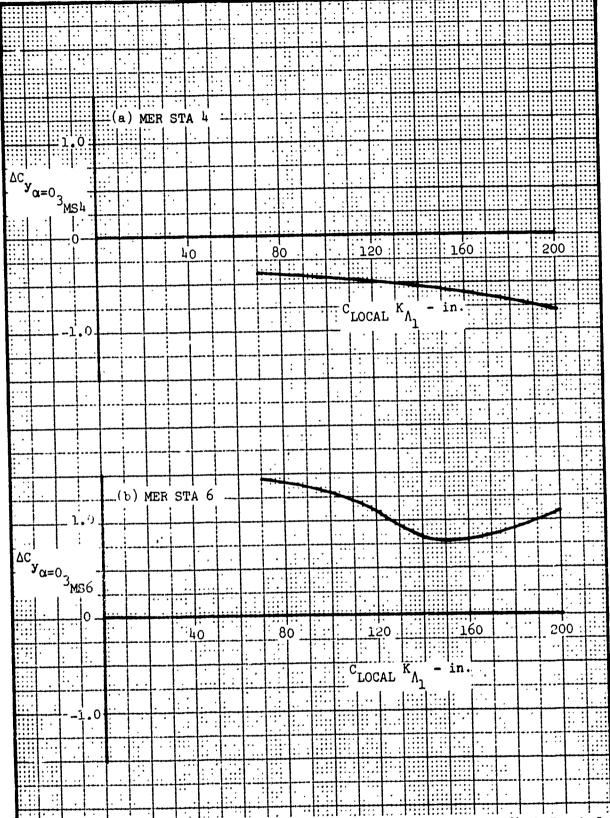


Figure 372. Side Force Intercept - Incremental Coefficient at Mach Break 3 for MER Stations 4 and 6

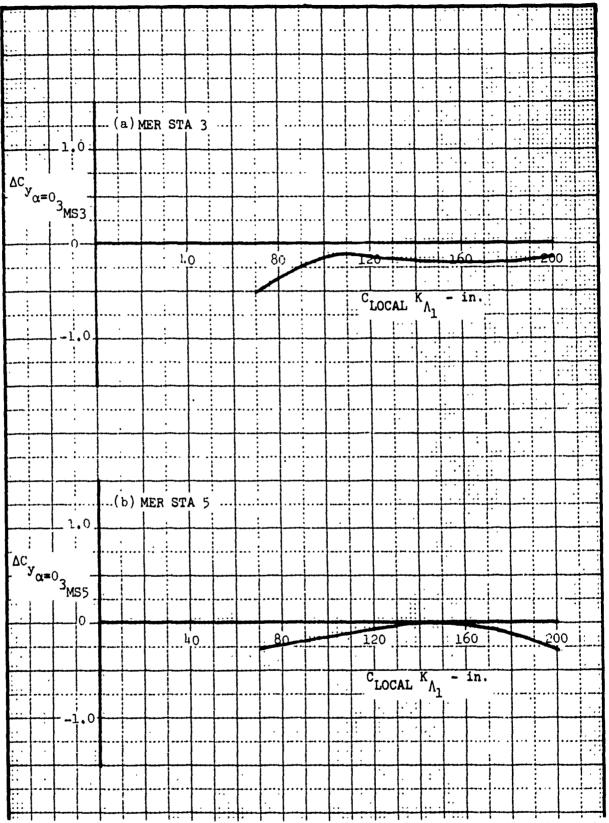


Figure 373. Side Force Intercept - Incremental Coefficient at Mach Break 3 for MER Stations 3 and 5

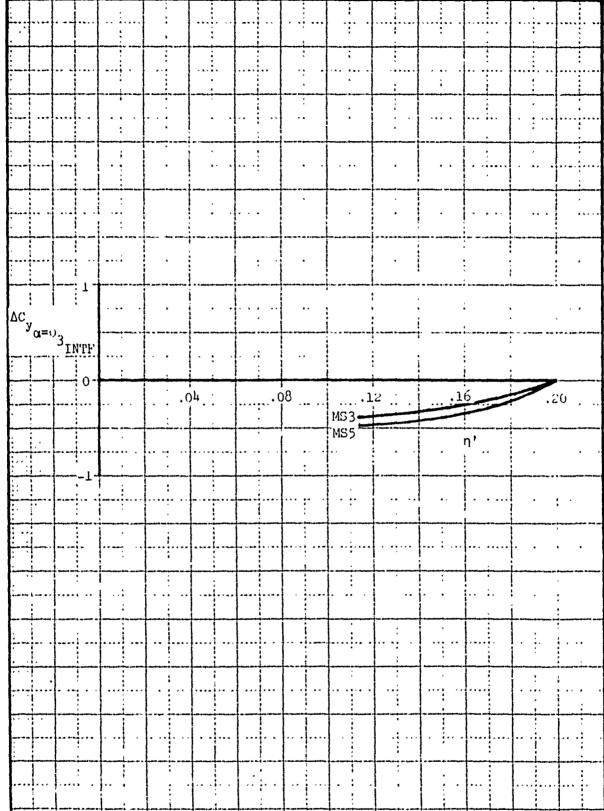


Figure 374. Side Force Intercept - Fuselage Interference Correction at Mach Break 3 for MER Stations 3 and 5

4.1.2 Increment - Aircraft Yaw

The captive store incremental side force due to aircraft yaw is obtained as the difference between the yawed pitch polar and the zero-yaw pitch polar data as outlined in Section III. The incremental side force slope, $\Delta\left(\frac{SF}{q}\right)_{\alpha}$, and intercept, $\Delta\left(\frac{SF}{q}\right)_{\alpha}$, thus obtained are linear with aircraft yaw angle; therefore, the incremental slope and intercept equations are derived and presented per degree of store yaw angle, β . The incremental airloads due to aircraft yaw are referenced to the coordinate system presented in Subsection 2.3.1.1.

To compute the incremental side force slope, $\Delta\left(\frac{SF}{q}\right)_{\alpha}$, the following equation is used.

$$\Delta \left(\frac{SF}{q}\right)_{\alpha} = \Delta \left(\frac{SF}{q}\right)_{\alpha_{\beta}} \cdot \beta$$

where:

 $\Delta \left(\frac{SF}{q}\right)_{\alpha\beta} - \text{Incremental side force slope per degree } \beta \text{ as}$ obtained by the methods presented in the following sections, $\frac{ft^2}{deg^2}$

Store yaw angle, deg., equal to +Ψ_{A/C} for right wing store installation or -Ψ_{A/C} for left wing store installations.

The equation and procedure for computing the incremental side force intercept, $\Delta\left(\frac{SF}{q}\right)_{\alpha=0}$, due to aircraft yaw is similar to the above presentation for incremental side force slope.

4.1.2.1 Slope Prediction

The incremental side force slope prediction is divided into two sections, fuselage centerline-mounted stores and wing-mounted stores. The technique presented in this section covers the Mach number range 0.5 to 1.6.

FUSELAGE CENTERLINE-MOUNTED STORES

MER STATIONS 1-6 (MS1-6):

$$\Delta \left(\frac{\text{SF}}{q}\right)_{\alpha_{\beta_{\xi}}} = \Delta C_{y_{\alpha_{\beta_{\xi}}}} K_{\text{SCALE}_{SF}}$$

where:

 $\Delta C_{y_{\alpha_{\beta_{\mathbf{C}}}}}$ - Variation of $C_{y_{\alpha_{\beta}}}$ presented as a function of Mach number, $\frac{1}{\deg^2}$, Figures 375 and 376.

 $K_{SCALE_{NF}}$ - Defined in Section 1V, ft².

WING-MOUNTED STORES

MER STATIONS 1, 3, and 5 (MS1,3,5):

$$\Delta \left(\frac{\text{SF}}{\text{q}}\right)_{\alpha_{\beta}} = (\Delta C_{y_{\alpha_{\beta}}} + K_{\ell_{\text{LE}_{A}}} \Delta C_{y_{\alpha_{\beta_{\ell_{\text{LE}_{A}}}}}})K_{\text{SCALE}_{\text{SF}}} K_{\Lambda_{1}}$$

$$MS1,3,5 \qquad MS1,3,5 \qquad \frac{LE_{A}}{C}$$

where:

- Incremental C per degree β presented as a function of wing spanwise position for Mach numbers 0.7, 0.9, 1.05, 1.2, and 1.6, $\frac{1}{\deg^2}$, Table 7.
- Proportioning factor based on the distance from the wing leading edge to the nose of the store on MER STATION 1 measured in the wing plan view divided by the local wing chord, positive, Figure 388.

 $\frac{\Delta C}{y_{\alpha}} = \frac{-\text{Incremental } C}{y_{\alpha}} \text{ per degree } \beta \text{ based on } y_{\alpha}$ $\frac{\beta l_{\text{LE}_{A}}}{C} = \frac{l_{\text{LE}_{A}}/C \text{ defined above and presented as a function of Mach number, } \frac{1}{\text{deg}^2}$ MER STA 1 - Figure 387

MER STA 1 - Figure 307
MER STA 3 - Figure 387
MER STA 5 - Figure 387

K_{SCALE_{SF}} - Defined in Section IV, ft².

K - Wing sweep correction factor, $\frac{\sin \Lambda}{\sin 45^{\circ}}$, where Λ is the quarter chord sweep of the aircraft wing.

MEP. STATIONS 2, 4, and 6 (MS2,3,6):

$$\Delta \left(\frac{\text{SF}}{q}\right)_{\alpha_{\beta}} = \Delta C_{y_{\alpha_{\beta}}} K_{\text{SCALE}_{SF}} K_{1}$$
MS2,4,6

where:

- Incremental C per degree β presented as a function of wing spanwise position for Mach numbers 0.7, 0.9, 1.05, 1.2, and 1.6, $\frac{1}{\deg^2}$, Table 7.

K_{SCALE</sup>SF - Defined in Section IV, ft².}

K_{\Lambda_1} - Defined in MS1, 3,5 above.

The variation of ΔC for MER STATIONS 1-6 is presented at $^{y}\alpha_{\beta}$ distinct Mach numbers of 0.7, 0.9, 1.05, 1.2, and 1.6. Table 7

presented below is a guide for locating the curves for ΔC $\quad \text{for } y_{\alpha_{\hat{\beta}}}$

each MER STATION at the Mach numbers indicated above. For Mach numbers between 0.5 and 0.7, the value at M=0.7 should be used in the computation. For Mach numbers between 0.7 and 1.6 other than those distinctly presented, linear interpolation should be used between the appropriate Mach numbers to obtain the required value for computation.

TABLE 7. INCREMENTAL SIDE FORCE SLOPE COEFFICIENT DUE TO YAW - FIGURE LOCATION GUIDE

		MACH NUMBER				
ΔC _{yαβ}	0.7	0.9	1.05	1.2	1.6	
		Figure Numbers				
MER STA 1	377	379	381	383	385	
MER STA 2	378	380	382	384	396	
MER STA 3	377	379	381	383	२ सेंट	
MER STA 4	378	380	382	384	336	
MER STA 5	377	379	381	383	335	
mer sta 6	378	380	382	384	386	

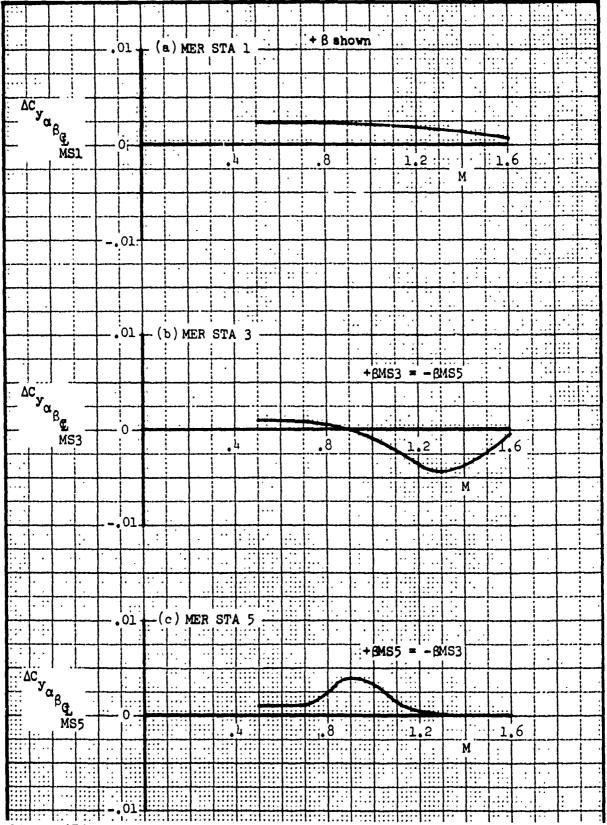


Figure 375. Incremental Side Force Slope Due to Yaw - Coefficient for Stores Mounted on Fuselage Centerline, MER Stations 1, 3, and 5

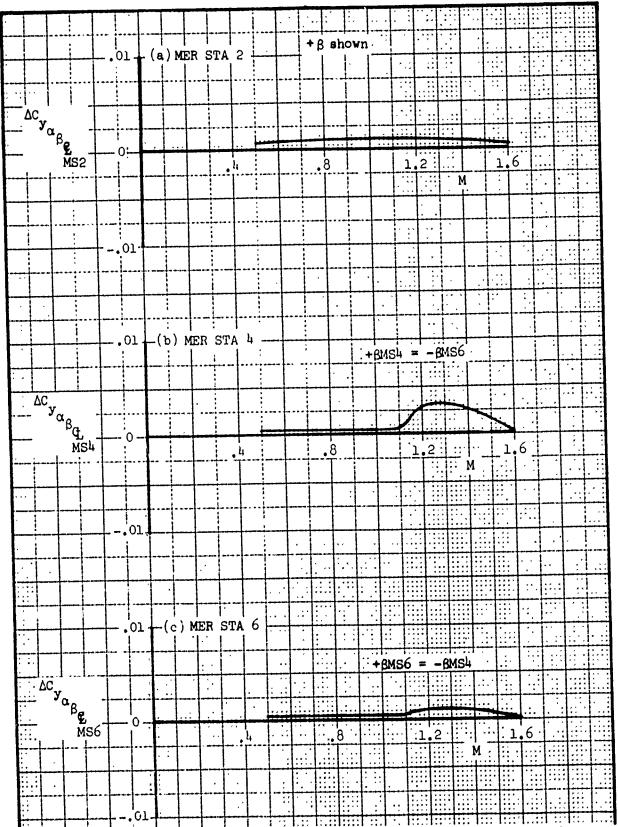


Figure 376. Incremental Side Force Slope Due to Yaw - Coefficient for Stores Mounted on Fuselage Centerline, MER Stations 2,4 and 6

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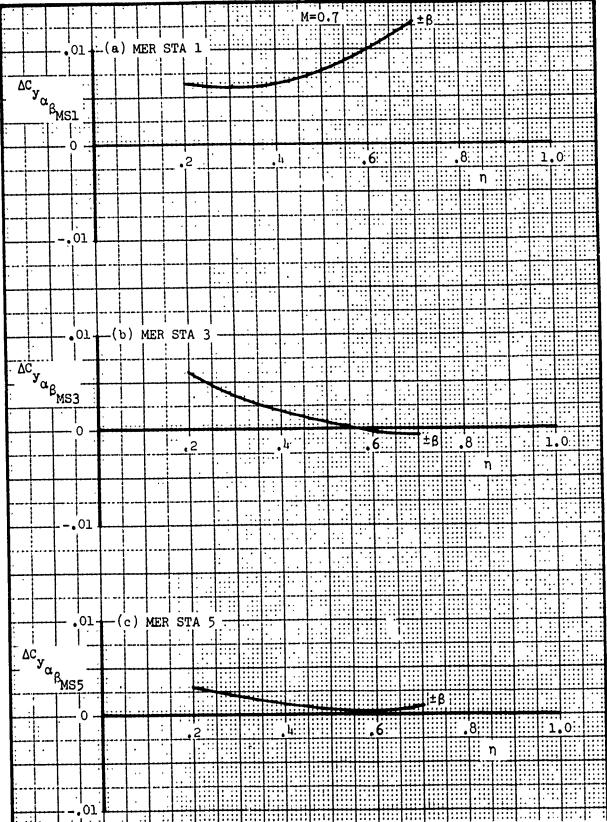


Figure 377. Incremental Side Force Slope Due to Yaw - Spanwise Correction at M=0.7 for MER Stations 1, 3 and 5

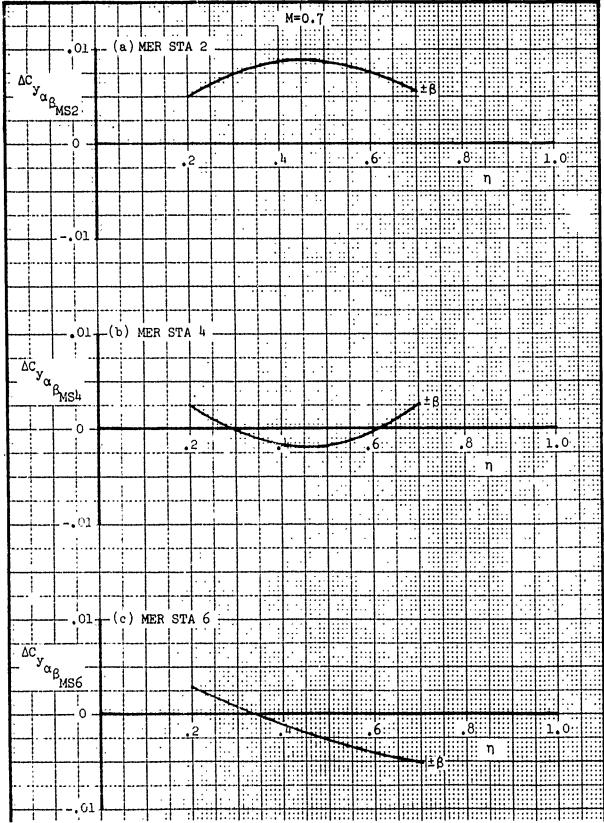


Figure 378. Incremental Side Force Slope Due to Yaw - Spanwise Correction at M=0.7 for MER Stations 2, 4 and 6

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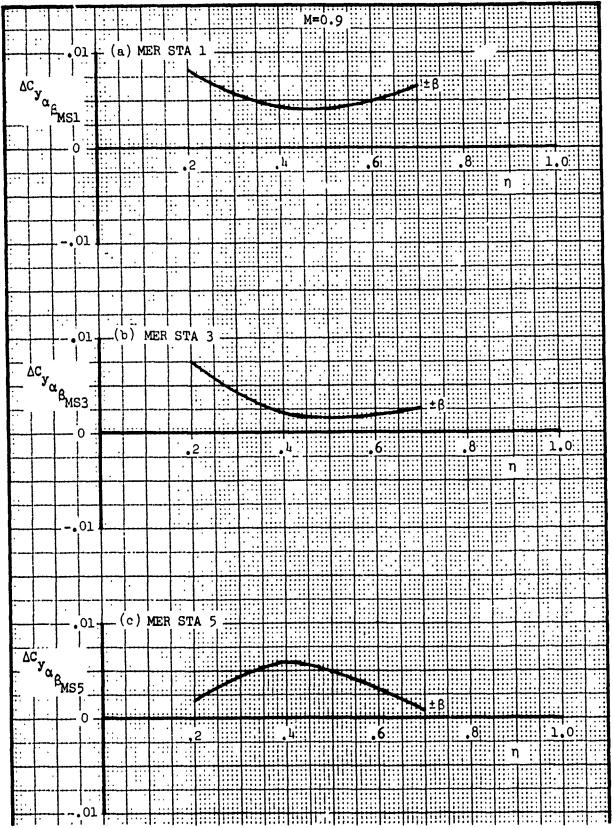


Figure 379. Incremental Side Force Slope Due to Yaw - Spanwise Correction at M=0.9 for MER Stations 1,3, and 5

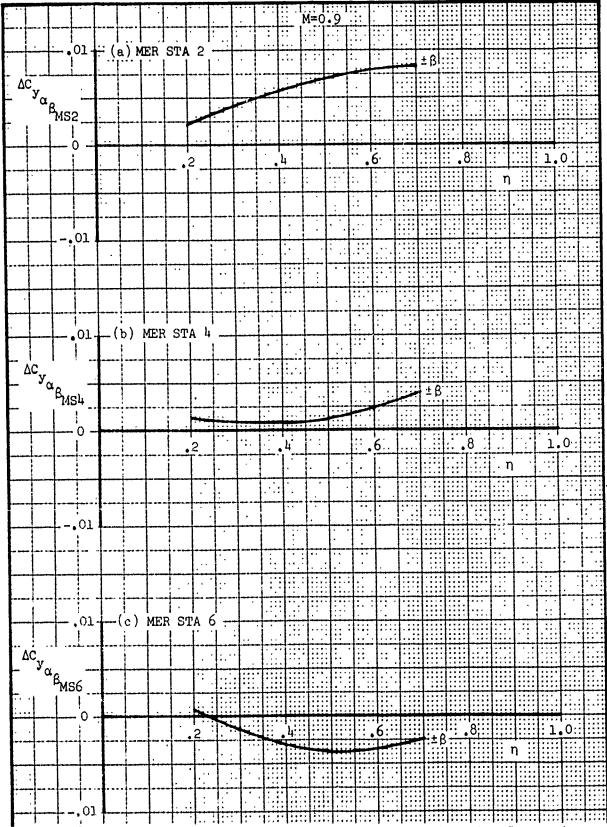


Figure 380. Incremental Side Force Slope Due to Yaw - Spanwise Correction at M=0.9 for MER Stations 2,4, and 6

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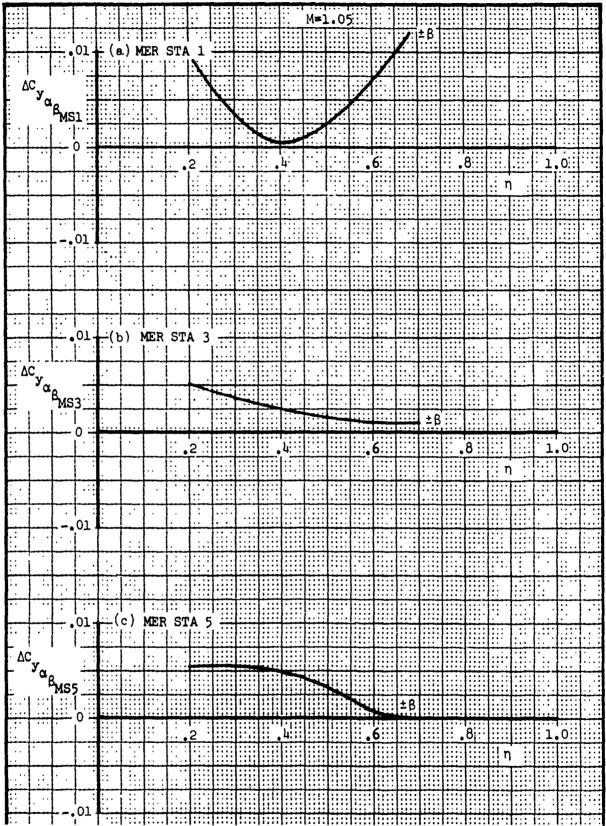


Figure 381. Incremental Side Force Slope Due to Yaw - Spanwise Correction at M=1.05 for MER Stations 1,3, and 5

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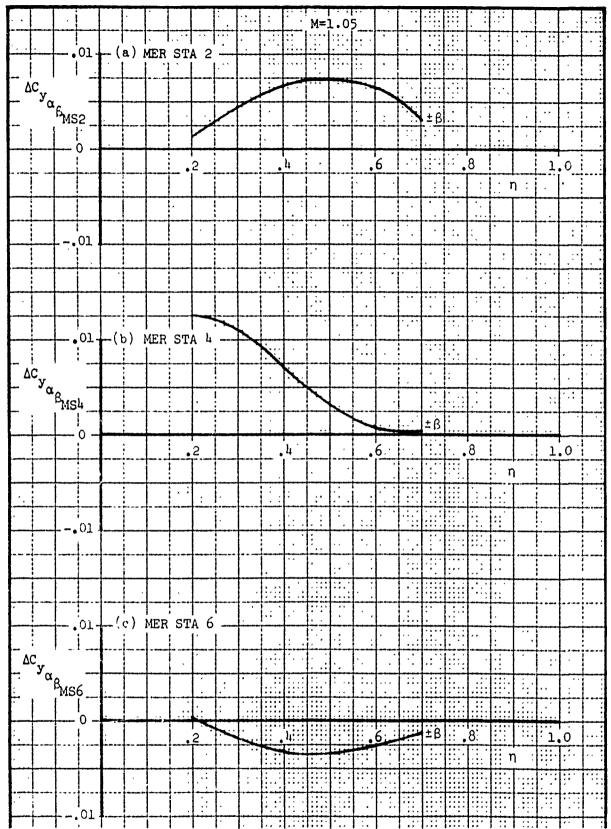


Figure 382. Incremental Side Force Slope Due to Yaw - Spanwise Correction at M=1.05 for MER Stations 2,4, and 6

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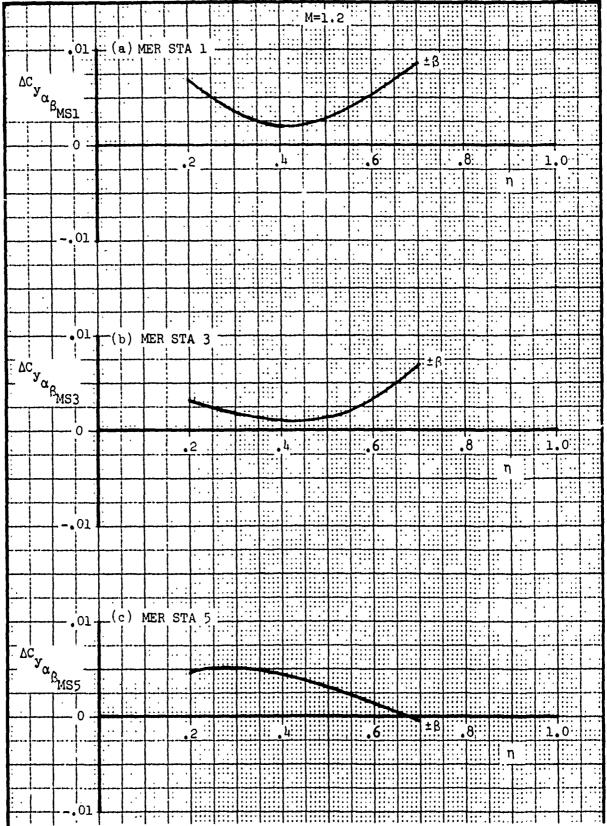


Figure 383. Incremental Side Force Slope Due to Yaw - Spanwise Correction at M=1.2 for MER Stations 1,3, and 5

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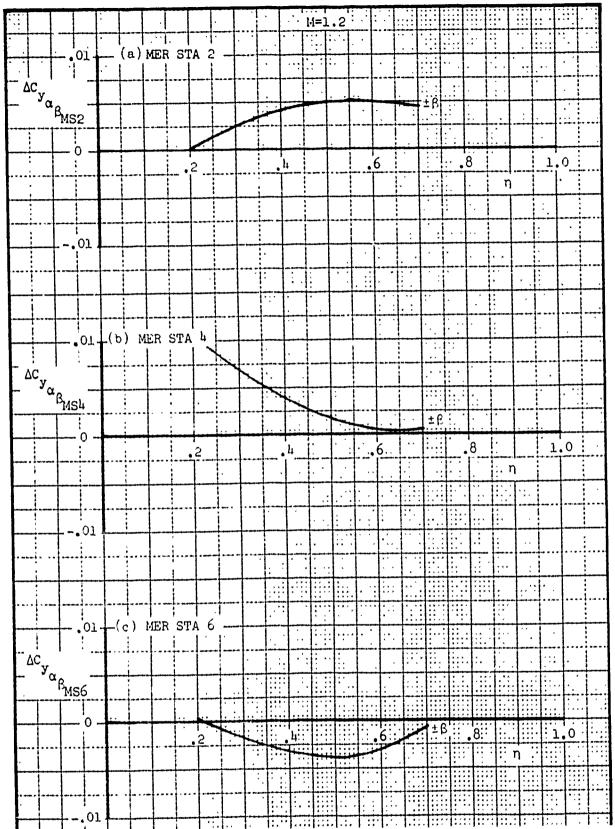
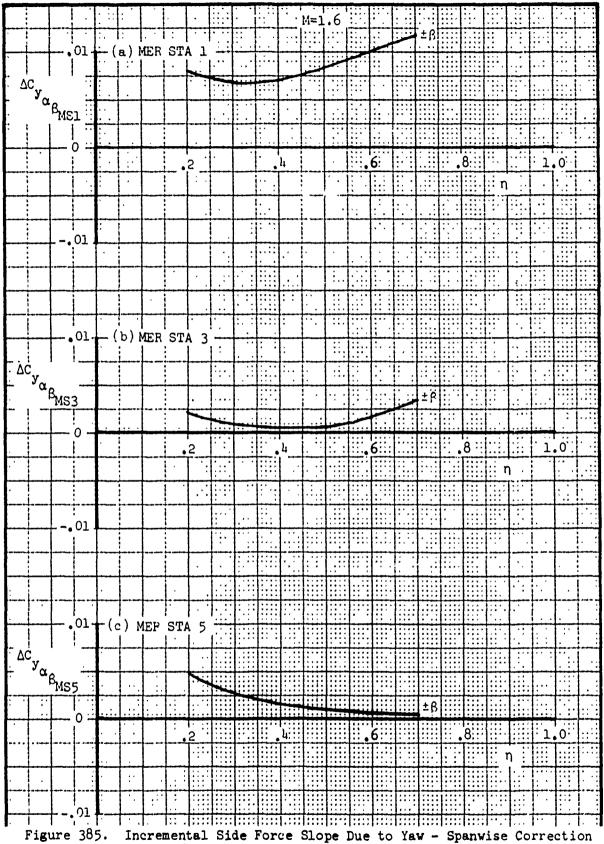


Figure 384. Incremental Side Force Slope Due to Yaw - Spanwise Correction at M=1.2 for MER Stations 2,4, and 6

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Incremental Side Force Slope Due to Yaw - Spanwise Correction at M=1.6 for MER Stations 1,3, and 5

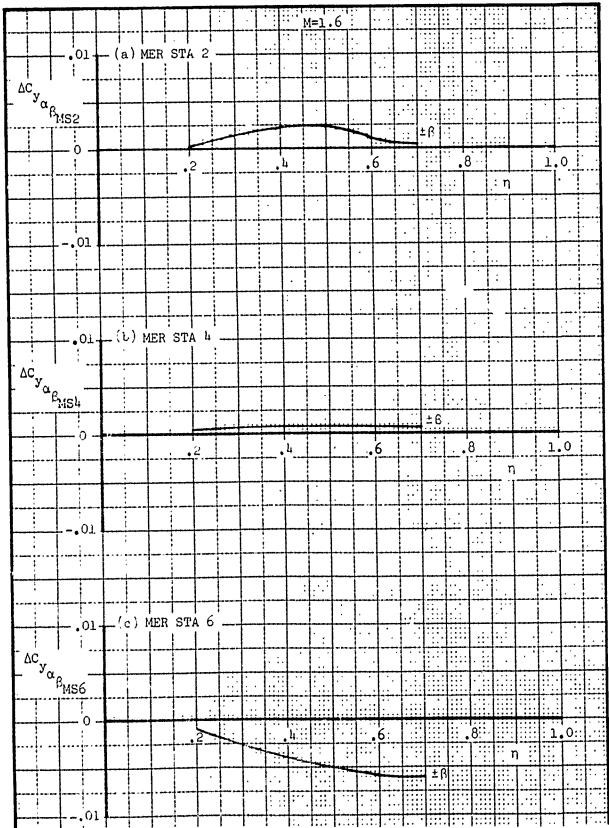


Figure 386. Incremental Side Force Stope Due to Yaw - Spanwise Correction at M=1.6 for MER Stations 2,4, and 6

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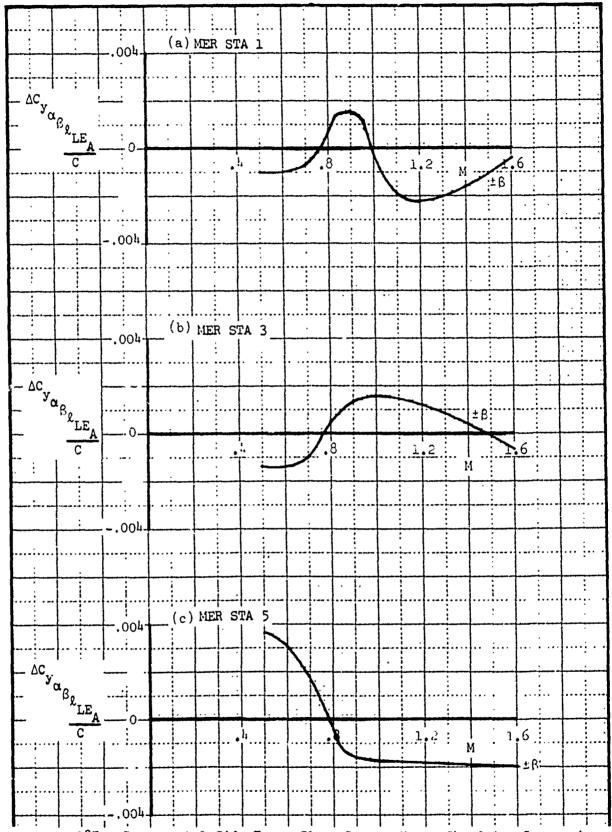


Figure 387. Incremental Side Force Slope Due to Yaw - Chordwise Correction for MER Stations 1,3, and 5

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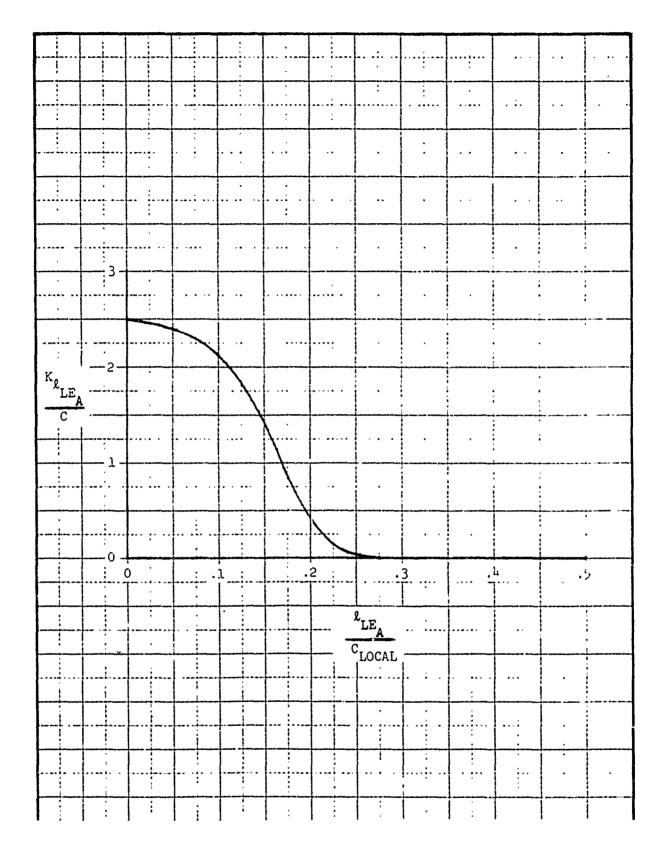


Figure 388. Incremental Side Force Slope Due to Yaw - Chordwise Correction Factor

4.1.2.2 Intercept Prediction

The incremental side force intercept prediction is divided into two sections, fuselage centerline-mounted stores and wing-mounted stores. The technique presented in this section covers the Mach number range 0.5 to 1.6.

FUSELAGE CENTERLINE-MOUNTED STORES

MER STATIONS 1-6 (MS1-6):

$$\Delta \left(\frac{\text{SF}}{\text{q}}\right)_{\alpha=0} \beta_{\mathbf{\xi}} = \Delta C_{\mathbf{y}_{\alpha=0}} \beta_{\mathbf{\xi}} K_{\text{SCALE}_{\text{SF}}}$$

where:

ΔC yα=0βε - Variation of C yα=0β presented as a function of Mach number,
$$\frac{1}{\text{deg}}$$
.

MER STA 1 - Figure 389

MER STA 2 - Figure 390

MER STA 3 - Figure 389

MER STA 4 - Figure 390

MER STA 5 - Figure 389

MER STA 6 - Figure 390

MER STA 6 - Figure 390

 $K_{SCALE_{SF}}$ - Defined in Section IV, ft².

WING-MOUNTED STORES

MER STATIONS 1, 3 and 5 (MS1,3,5):

$$\Delta \left(\frac{\text{SF}}{\text{q}}\right)_{\alpha=0} = \left(\Delta C_{y_{\alpha=0}} + K_{L_{\text{LE}_{A}}} \Delta C_{y_{\alpha=0}} \right) K_{\text{SCALE}_{\text{SF}}} K_{\Lambda_{1}}$$

$$MS1,3,5 \qquad MS1,3,5 \qquad \frac{L_{\text{LE}_{A}}}{C}$$

where:

- $\begin{array}{c} \Delta C \\ y_{\alpha=0} \\ \end{array} \begin{array}{c} \text{ Incremental } C \\ \text{ as a function of wing spanwise position} \\ \text{ for Mach numbers 0.7, 0.9, 1.05, 1.2, and} \\ 1.6, \frac{1}{\text{deg}}, \text{ Table 8.} \end{array}$
 - Proportioning factor based on the distance from the wing leading edge to the nose of the store on MER STATION 1 measured in the wing plan view divided by the local wing chord, positive, Figure 358, Subsection 4.1.2.1.

 - $K_{SCALE_{SF}}$ Defined in Section IV, it².
- Karland Wing sweep correction factor, $\frac{\sin \Lambda}{\sin 45^{\circ}}$, where Λ is the quarter chord sweep of the aircraft wing.

MER STATIONS 2, 4, and 6 (MS2,4,6):

$$\Delta \left(\frac{\text{SF}}{\text{q}}\right)_{\alpha=0_{\beta}} = \Delta C_{y_{\alpha=0_{\beta}}} K_{\text{SCALE}_{\text{SF}}} K_{1}$$

$$MS2,4,6 MS2,4,6$$

where:

 $\begin{array}{c} \Delta C_{y_{\alpha=0}} & - \text{ Incremental } C_{y_{\alpha=0}} & \text{per degree } \beta \text{ presented as a} \\ & \text{ function of wing spanwise position for Mach} \\ & \text{ numbers 0.7, 0.9, 1.05, 1.2, and 1.6, } \frac{1}{\deg}, \\ & \text{ Table 8.} \\ K_{SCALE_{SF}} & - \text{ Defined in Section IV, ft}^2. \end{array}$

 K_{Λ_1} - Defined in MS1, 3, 5 above.

The variation of $\Delta C_{\gamma_{\alpha=0}}^{}$ for MER STATIONS 1 to 6 is presented at distinct Mach numbers of 0.7, 0.9, 1.05, 1.2, and 1.6. Table 8 presented below is a guide for locating the curves for $\Delta C_{\gamma_{\alpha=0}}^{}$ for each MER station at the Mach numbers indicated above. For Mach numbers between 0.5 and 0.7, the value at M = 0.7 should be used in the computation. For Mach numbers between 0.7 and 1.6, other than those distinctly presented, linear interpolation should be used between the appropriate Mach numbers to obtain the required value for computation.

Table 8. INCREMENTAL SIDE FORCE INTERCEPT COEFFICIENT DUE TO YAW - FIGURE LOCATION GUIDE

	MACH HUMBER						
ΔC y _{α=0} _β	0.7	0.9	1.05	1.2	1.6		
	Figure Numbers						
MER STA 1	591	393	305	35	301		
MER STA 2	392	391	396	२०%	400		
MER STA 3	391	393	395	304	300		
MER STA 4	392	3914	326	33.5	1,00		
MER STA 5	391	393	395	27	379		
MER STA 6	392	394	390	398	400		

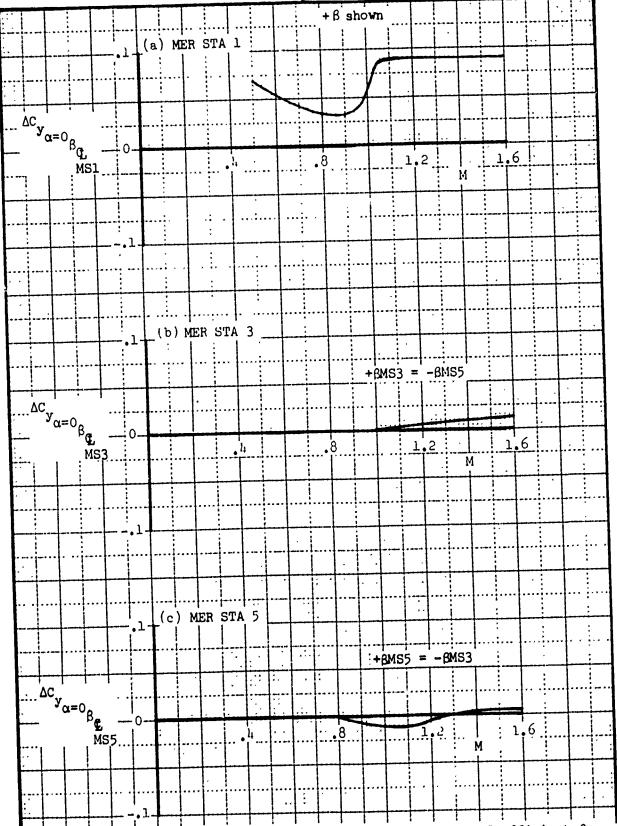


Figure 389. Incremental Side Force Intercept Due to Yaw - Coefficient for Stores Mounted on Fuselage Centerline, MER Stations 1,3 and 5

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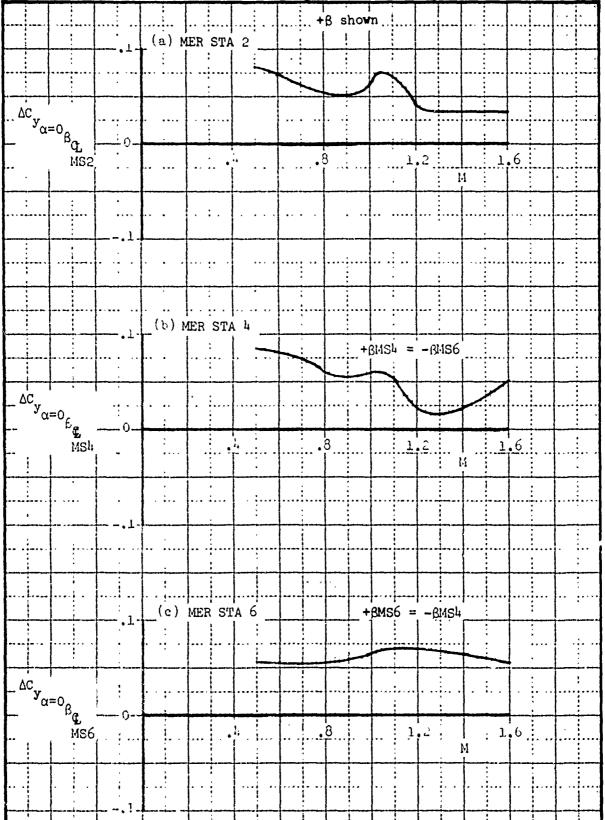


Figure 390. Incremental Side Force Intercept Due to Yaw - Coefficient for Stores Mounted on Fuselage Centerline, MER Stations 2,4, and 6

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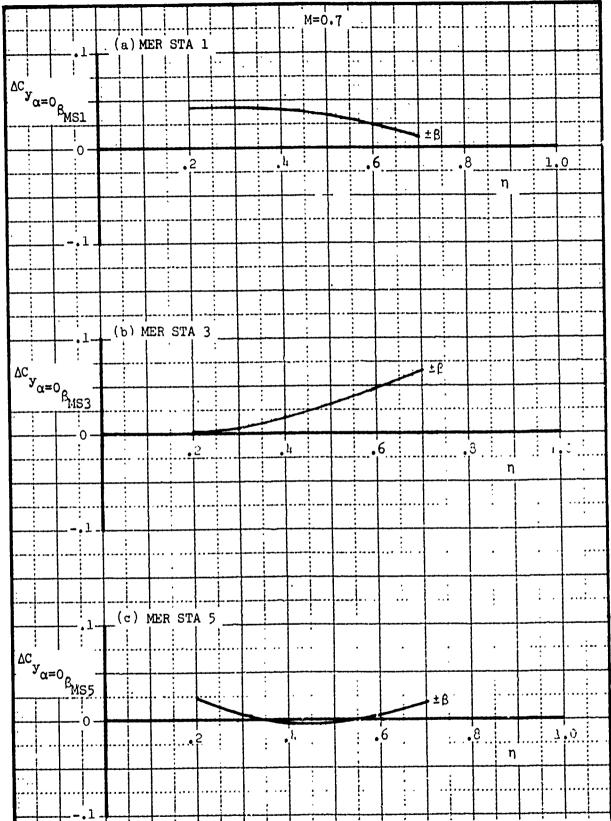


Figure 391. Incremental Side Force Intercept Due to Yaw - Spanwise Correction at M=0.7 for MER Stations 1,3, and 6

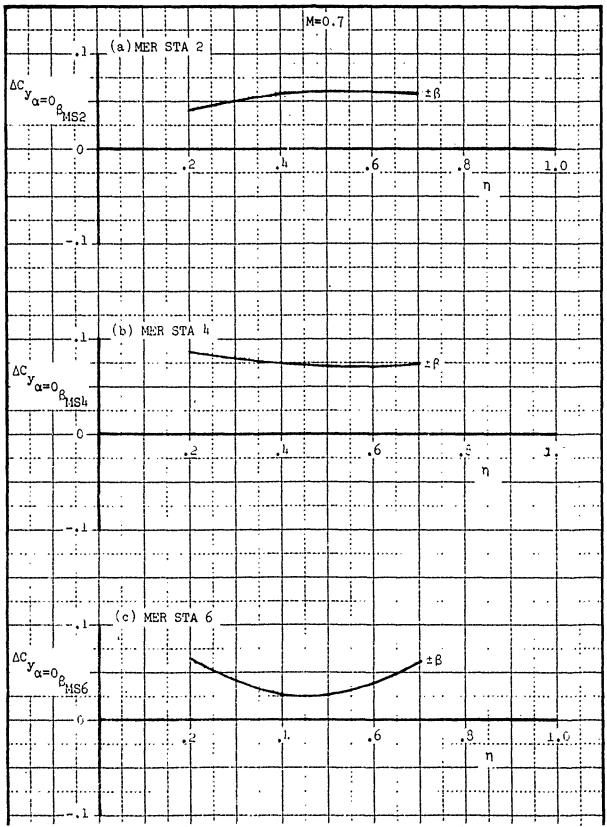


Figure 392. Incremental Side Force Intercept Due to Yaw - Spanwise Correction at M=0.7 for MER Stations 2,4, and 6

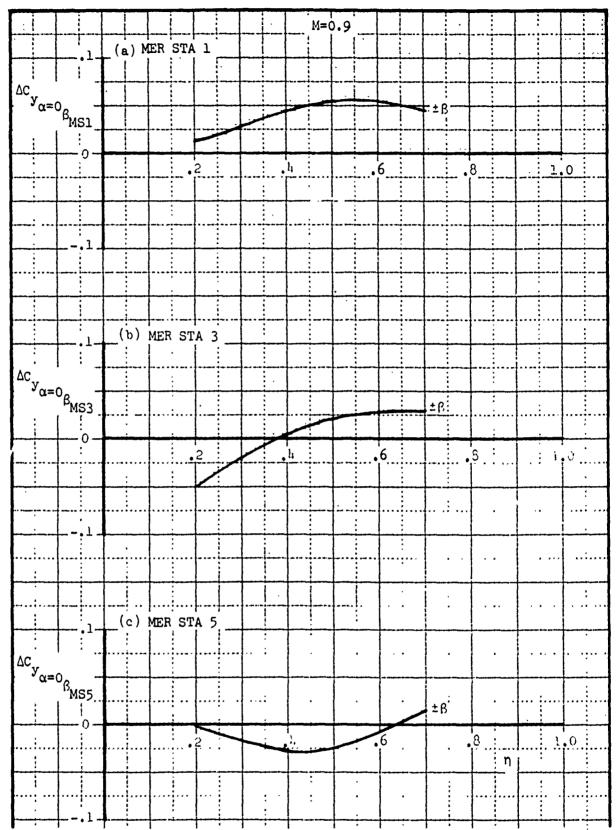
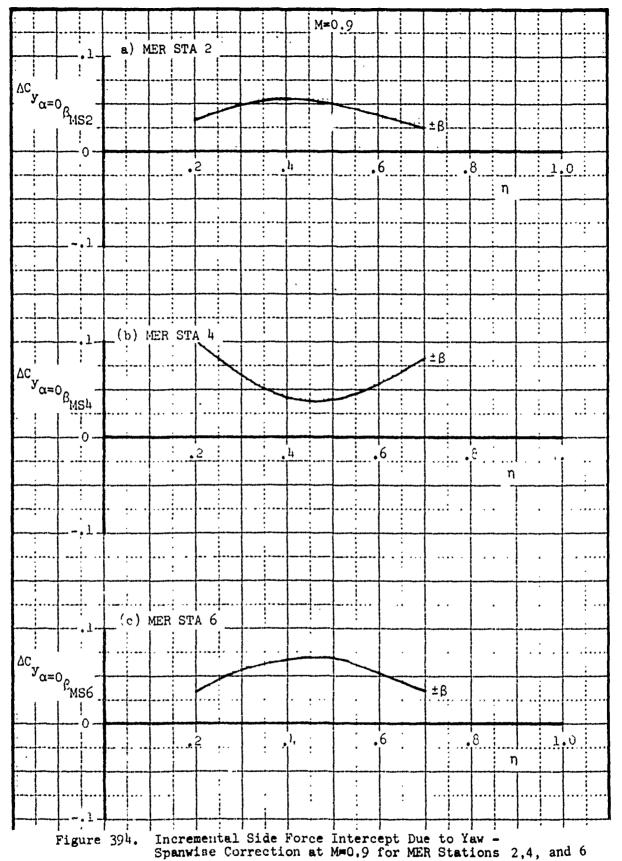


Figure 393. Incremental Side Force Intercept Due to Yaw Spanwise Correction at M=0.9 for MER Stations 1,3, and 6



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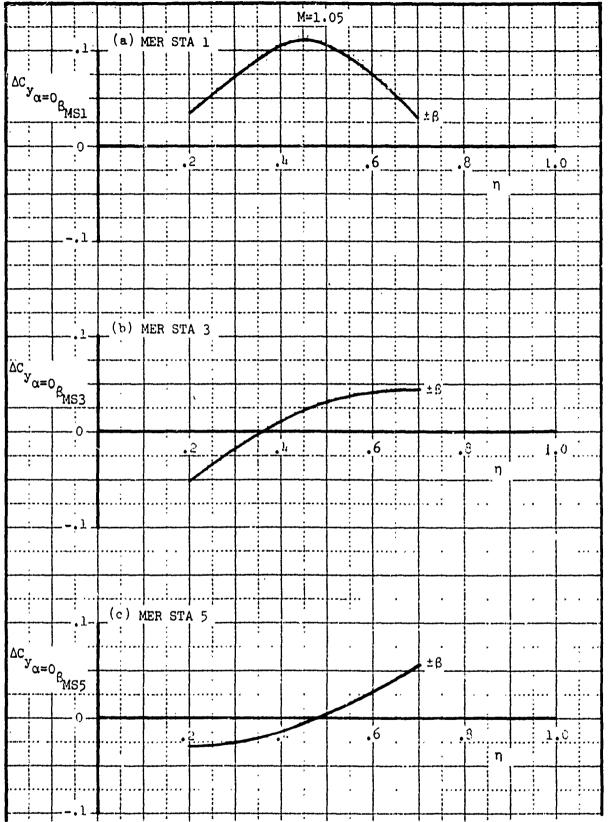


Figure 395. Incremental Side Force Intercept Due to Yaw - Spanwise Correction at M=1.05 for MER Stations 1,3, and 5

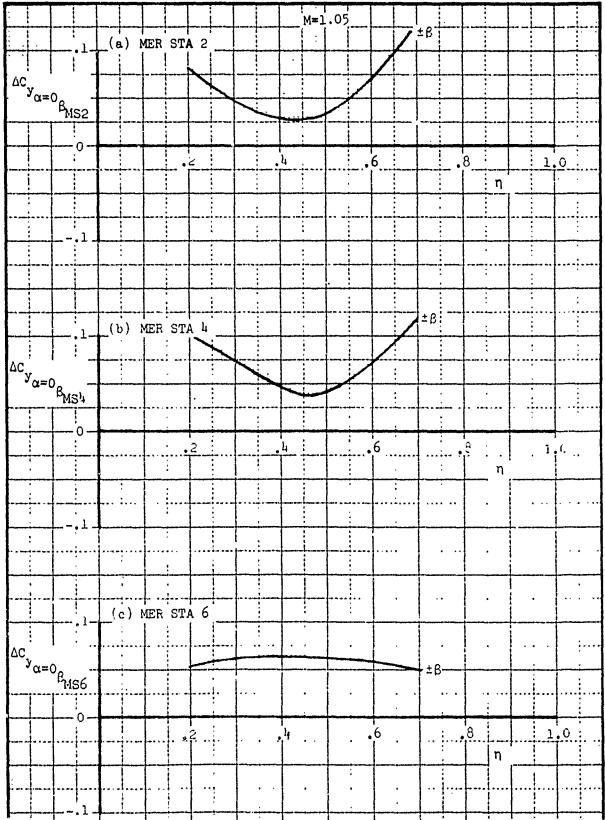


Figure 396. Incremental Side Force Intercept Due to Yaw - Spanwise Correction at M=1.05 for MER Stations 2, h, and 6

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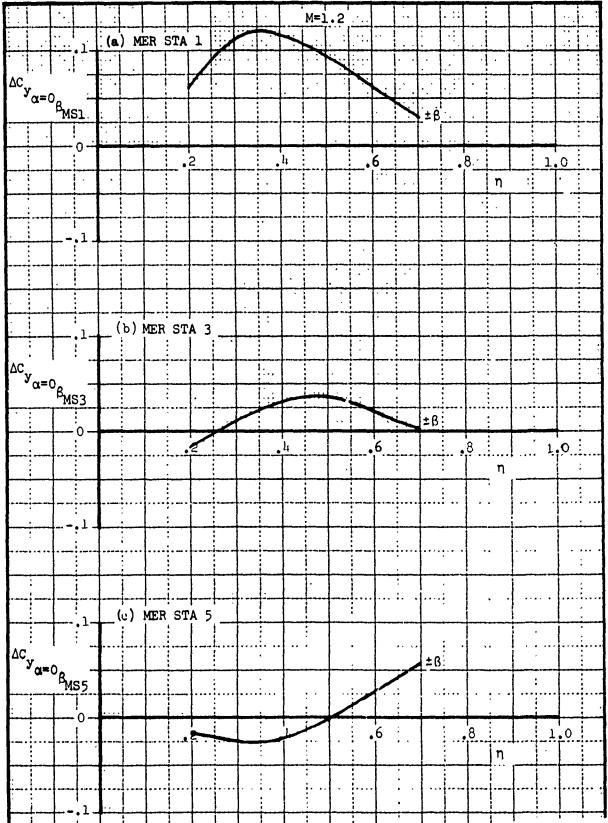


Figure 397. Incremental Side Force Intercept Due to Yaw Spanwise Correction at M=1.2 for MER Stations 1,3, and 5

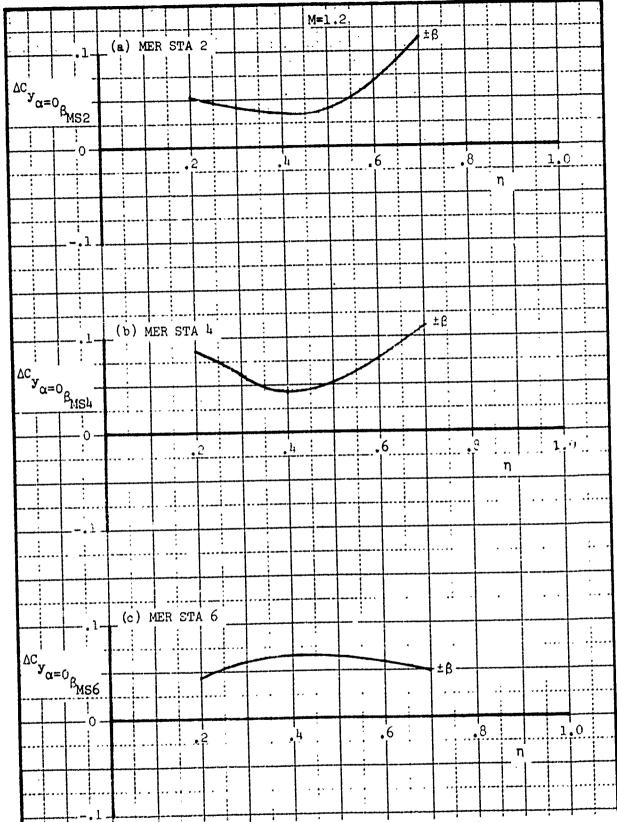


Figure 398. Incremental Side Force Intercept Due to Yaw Spanwise Correction at M=1.2 for MER Stations 2,4, and 6

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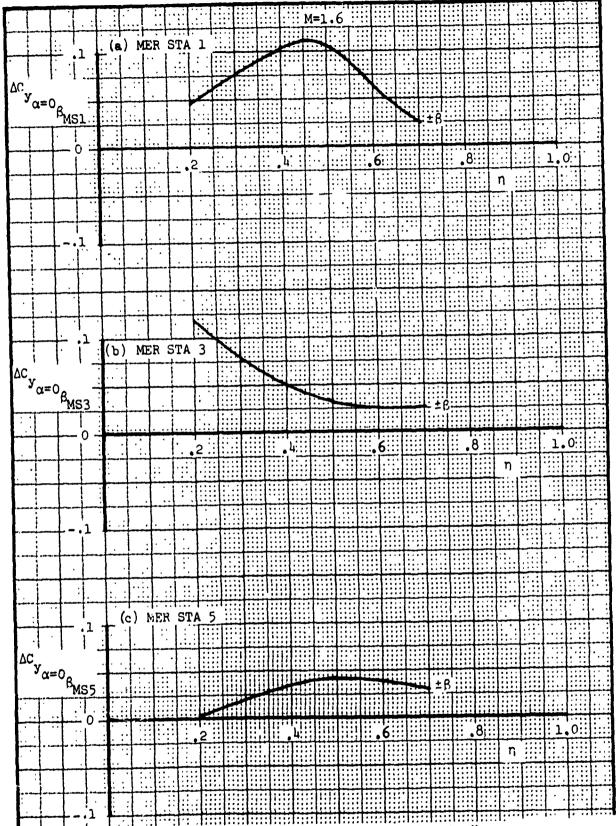
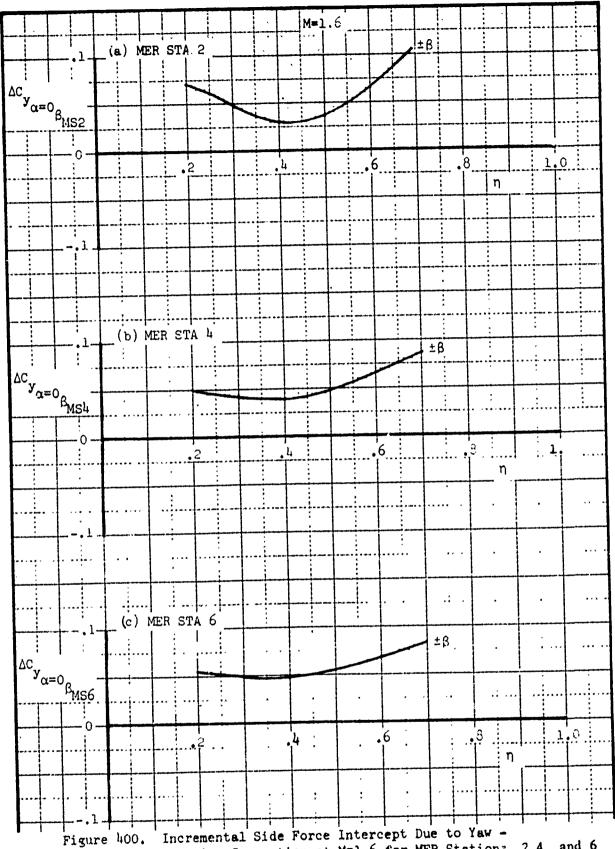


Figure 399. Incremental Side Force Intercept Due to Yaw Spanwise Correction at M=1.6 for MER Stations 1,3 and 5



Spanwise Correction at M=1.6 for MER Stations 2,4, and 6

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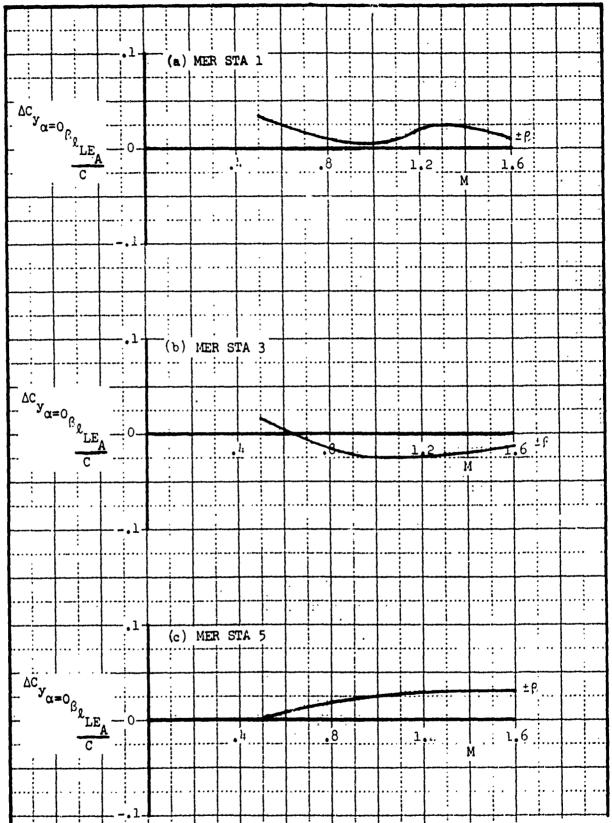


Figure 401. Incremental Side Force Intercept Due to Yaw - Chordwise Correction for MER Stations 1,3, and 5

4.1.3 Increment - Adjacent Store Interference

Methods to predict the increment in captive store side force variation with angle of attack, $\Delta \left(\frac{SF}{g} \right)_{\alpha}$, and the value at $\alpha=0$, $\Delta\left(\frac{SF}{q}\right)_{\alpha=0}$, for multiple carried stores are presented within this section. The basic prediction is made as a function of minimum store to store separation distance $y_{TN\Psi F}$ (see Subsection 3.1.3), at discrete Mach numbers. The data are presented separately for the aft cluster of stores on MER CTATIONS 1, 3, and 5, and the forward cluster, MER STATIONS 2, 4, and 6. Predictions are also separately made for inboard - outboard interference, the interfering store carried inboard of the subject captive store, and outboard - inboard interference, the interfering store carried outboard of the subject captive store. On the curves defining the basic prediction ADJ. SHOULDER refers to the MER shoulder store adjacent to the interfering store, OPPOSITE SHOULDER is the MER shoulder store furthest displaced laterally in motion interfering store, and L STORE is the MER centerline store, Will STATION 1 or 2.

4.1.3.1 Slope Prediction

The equations governing the prediction of incremental side force variation with angle of attack are presented below.

INTERFERING STORES CARRIED INBOARD

MER STATIONS 1,2,3,4,5, and 6 (MS1-6):

AT A GIVEN MACH NUMBER:

$$\Delta \left(\frac{.SF}{q} \right)_{\alpha} = \left(\sum \Delta C_{y_{\alpha}} \right) K_{SCALE_{SF}}$$

$$MS1-6 \qquad IB\rightarrow OB$$

$$MS1-6$$

where:

 $\Delta C_{y_{\alpha}}$ - Incremental side force slope coefficient due to inboard to outboard interference as a function of y_{TMTF} , see Table 9.

 $K_{SCALE_{SF}}$ - Side force scale factor, ft² , see Section IV.

INTERFERING STORES CARRIED OUTBOARD

MER STATIONS 1,2,3,4,5, and 6 (MS1-6):

AT A GIVEN MACH HUMBER:

$$\Delta \left(\frac{\text{SF}}{\text{q}}\right)_{\alpha} = \left(\sum_{\alpha} \Delta c_{y_{\alpha}}\right) K_{\text{SCALE}_{\text{SF}}}$$

$$MS1-6 \qquad 0B+1B$$

$$MS1-6$$

where:

 ΔC - Incremental side force slope coefficient due to outboard to inboard interference as a function of y_{INTF} , $\frac{1}{\text{deg}}$, see Table 9.

 $K_{SCALE_{SF}}$ - Side force scale factor, ft² , see Section IV.

INTERFERING STORES CARRIED INBOARD AND OUTBOARD

MER STATIONS 1,2,3,4,5, and 6 (MS1-6):

AT A GIVEN MACH NUMBER:

$$\Delta \left(\frac{\text{SF}}{q}\right)_{\alpha} = \left[K_{\text{INTC}_{1}} + K_{\text{SLOPE}_{1}}\left(\sum \Delta C_{y_{\alpha}} + \sum \Delta C_{y_{\alpha}}\right)\right] K_{\text{SCALE}_{SF}}$$

$$= \left[K_{\text{INTF}_{1}} + K_{\text{SLOPE}_{1}}\left(\sum \Delta C_{y_{\alpha}} + \sum \Delta C_{y_{\alpha}}\right)\right] K_{\text{SCALE}_{SF}}$$

$$= \left[K_{\text{INTC}_{1}} + K_{\text{SLOPE}_{1}}\left(\sum \Delta C_{y_{\alpha}} + \sum \Delta C_{y_{\alpha}}\right)\right] K_{\text{SCALE}_{SF}}$$

$$= \left[K_{\text{INTC}_{1}} + K_{\text{SLOPE}_{1}}\left(\sum \Delta C_{y_{\alpha}} + \sum \Delta C_{y_{\alpha}}\right)\right] K_{\text{SCALE}_{SF}}$$

$$= \left[K_{\text{INTF}_{1}} + K_{\text{SLOPE}_{1}}\left(\sum \Delta C_{y_{\alpha}} + \sum \Delta C_{y_{\alpha}}\right)\right] K_{\text{SCALE}_{SF}}$$

$$= \left[K_{\text{INTF}_{1}} + K_{\text{SLOPE}_{1}}\left(\sum \Delta C_{y_{\alpha}} + \sum \Delta C_{y_{\alpha}}\right)\right] K_{\text{SCALE}_{SF}}$$

$$= \left[K_{\text{INTF}_{1}} + K_{\text{SLOPE}_{1}}\left(\sum \Delta C_{y_{\alpha}} + \sum \Delta C_{y_{\alpha}}\right)\right] K_{\text{SCALE}_{SF}}$$

$$= \left[K_{\text{INTF}_{1}} + K_{\text{SLOPE}_{1}}\left(\sum \Delta C_{y_{\alpha}} + \sum \Delta C_{y_{\alpha}}\right)\right] K_{\text{SCALE}_{SF}}$$

$$= \left[K_{\text{INTF}_{1}} + K_{\text{SLOPE}_{1}}\left(\sum \Delta C_{y_{\alpha}} + \sum \Delta C_{y_{\alpha}}\right)\right] K_{\text{SCALE}_{SF}}$$

$$= \left[K_{\text{INTF}_{1}} + K_{\text{SLOPE}_{1}}\left(\sum \Delta C_{y_{\alpha}} + \sum \Delta C_{y_{\alpha}}\right)\right] K_{\text{SCALE}_{SF}}$$

$$= \left[K_{\text{INTF}_{1}} + K_{\text{SLOPE}_{1}}\left(\sum \Delta C_{y_{\alpha}} + \sum \Delta C_{y_{\alpha}}\right)\right] K_{\text{SCALE}_{SF}}$$

$$= \left[K_{\text{INTF}_{1}} + K_{\text{SLOPE}_{1}}\left(\sum \Delta C_{y_{\alpha}} + \sum \Delta C_{y_{\alpha}}\right)\right] K_{\text{SCALE}_{SF}}$$

$$= \left[K_{\text{INTF}_{1}} + K_{\text{SLOPE}_{1}}\left(\sum \Delta C_{y_{\alpha}} + \sum \Delta C_{y_{\alpha}}\right)\right] K_{\text{SCALE}_{SF}}$$

$$= \left[K_{\text{INTF}_{1}} + K_{\text{SLOPE}_{1}}\left(\sum \Delta C_{y_{\alpha}} + \sum \Delta C_{y_{\alpha}}\right)\right] K_{\text{SCALE}_{SF}}$$

$$= \left[K_{\text{INTF}_{1}} + K_{\text{SLOPE}_{1}}\left(\sum \Delta C_{y_{\alpha}} + \sum \Delta C_{y_{\alpha}}\right)\right] K_{\text{SCALE}_{SF}}$$

$$= \left[K_{\text{INTF}_{1}} + K_{\text{SLOPE}_{1}}\left(\sum \Delta C_{y_{\alpha}} + \sum \Delta C_{y_{\alpha}}\right)\right] K_{\text{SCALE}_{SF}}$$

where:

- Intercept for the inboard - outboard combination correction for side force slope, $\frac{1}{\deg}$, Figure 18.

K_{SLOPE} - Slope for the inboard-outboard combination correction for side force slope, Figure 41:

 $\Delta C_{y_{cl}}$ - Previously defined. INTF IB+OB

ΔC - Previously defined.

INTF
Ob→IB

 $K_{\text{SCALE}_{\text{SF}}}$ - Side force scale factor, ft² , see Section IV.

The above equations define the interference increment calculation at a given Mach number. For Mach numbers other than those presented, M = 0.7, 0.9, 1.05, 1.2, 1.6, these guidelines should be followed. If the subject Mach number is less than M = 0.7, use the value at M = 0.7. For other Mach numbers linear interpolation should be used between the Mach numbers which are presented.

TABLE 9. INCREMENTAL SIDE FORCE SLOPE COEFFICIENT DUE TO INTERFERENCE - FIGURE LOCATION GUIDE

	MACH NUMBER							
ac Intf	0.7	0.9	1.05	1.2	1.6			
	Figure Number							
Adj. Shoulder- Fwd. Cluster	402	403	ħ0ħ	405	406			
Adj. Shoulder- Aft Cluster	402	403	404	405	406			
& Store- Fwd. Cluster	407	ħ08	409	h10	411			
Ç Store- Aft Cluster	407	408	409	410	411			
Opposite Shoulder- Fwd. Cluster	412	413	414	415	1,16			
Opposite Shoulder- Aft Cluster	412	413	կլկ	415	1416			

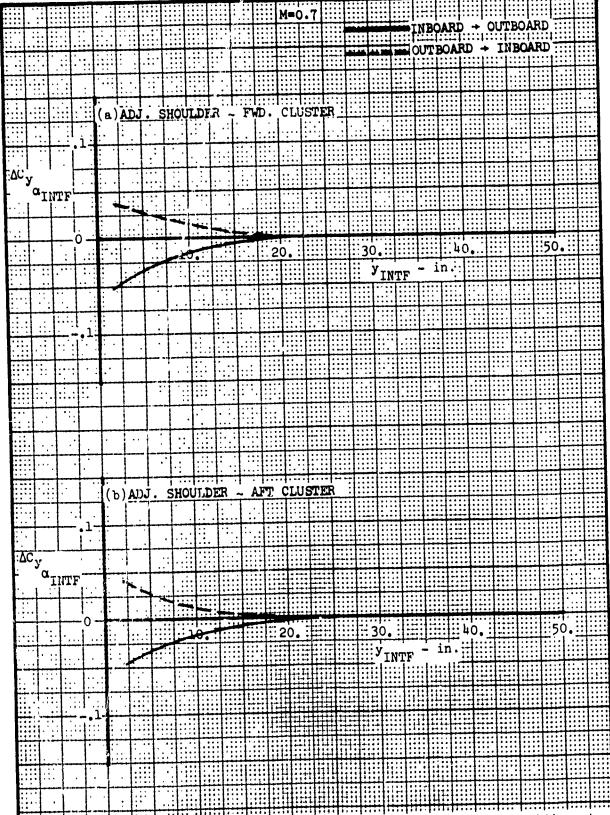


Figure 402. Incremental Side Force Slope Due to Interference - Adjacent Shoulder at M=0.7

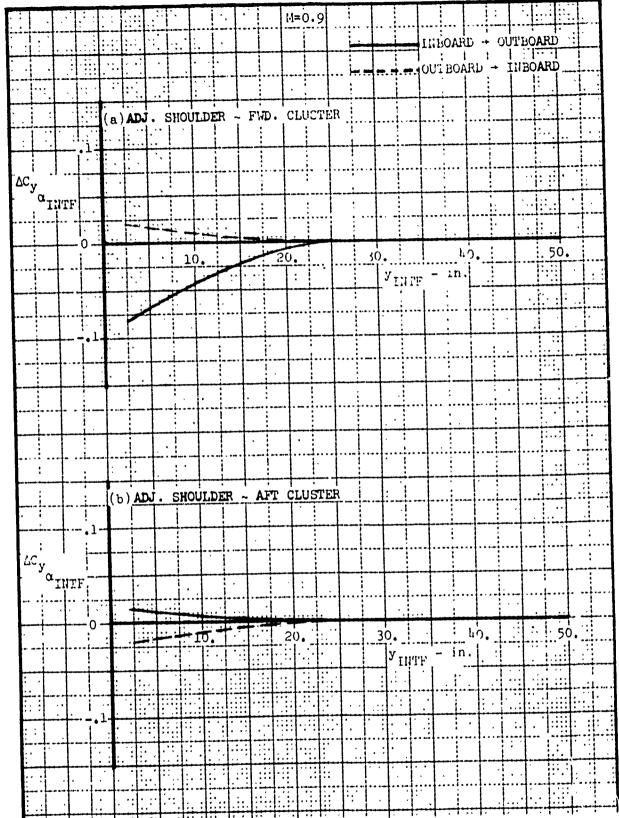


Figure 403. Incremental Side Force Slope Due to Interference - Adjacent Shoulder at M=0.9

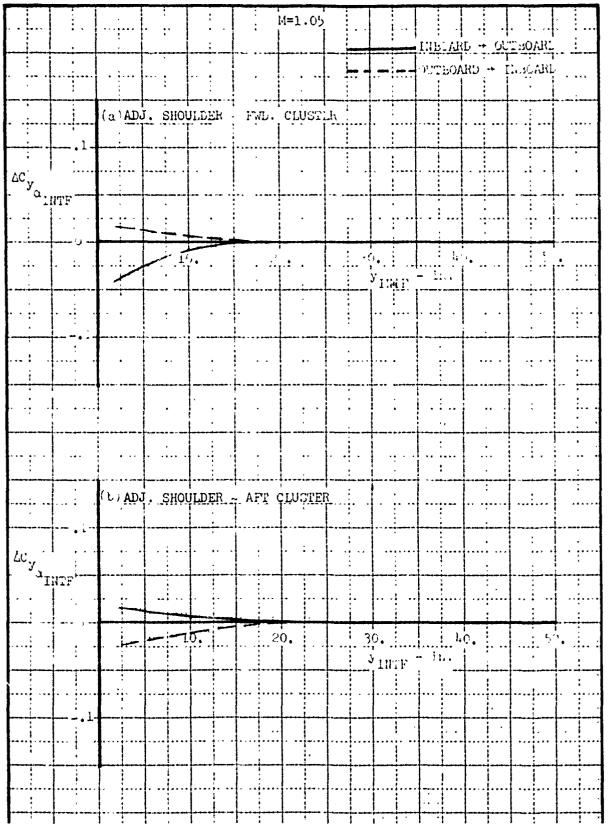


Figure 404. Incremental Side Force Slope Due to Interference - Adjacent Shoulder at M=1.05

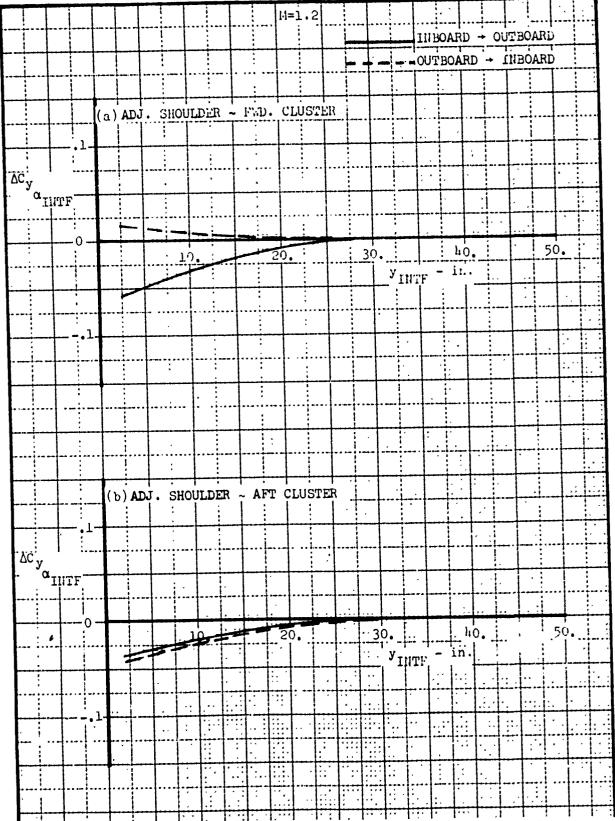


Figure h05. Incremental Side Force Slope Due to Interference - Adjacent Shoulder at M=1.2

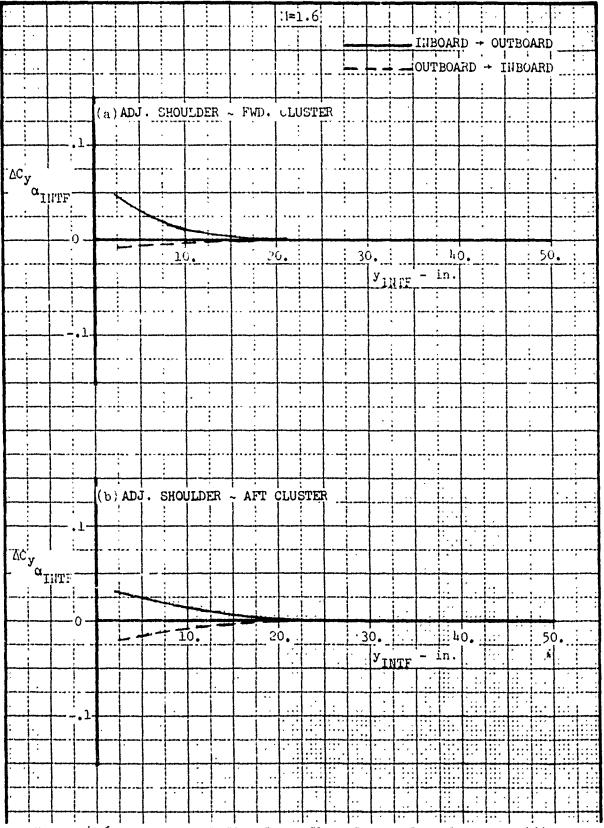


Figure 406. Incremental Side Force Slope Due to Interference - Adjacent Shoulder at M=1.6

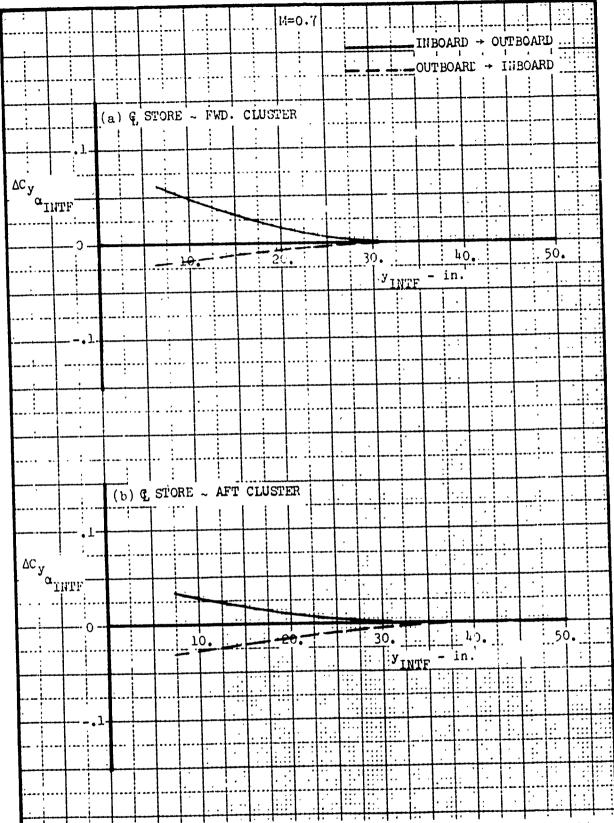


Figure 407. Incremental Side Force Slope Due to Interference - Centerline Store at M=0.7

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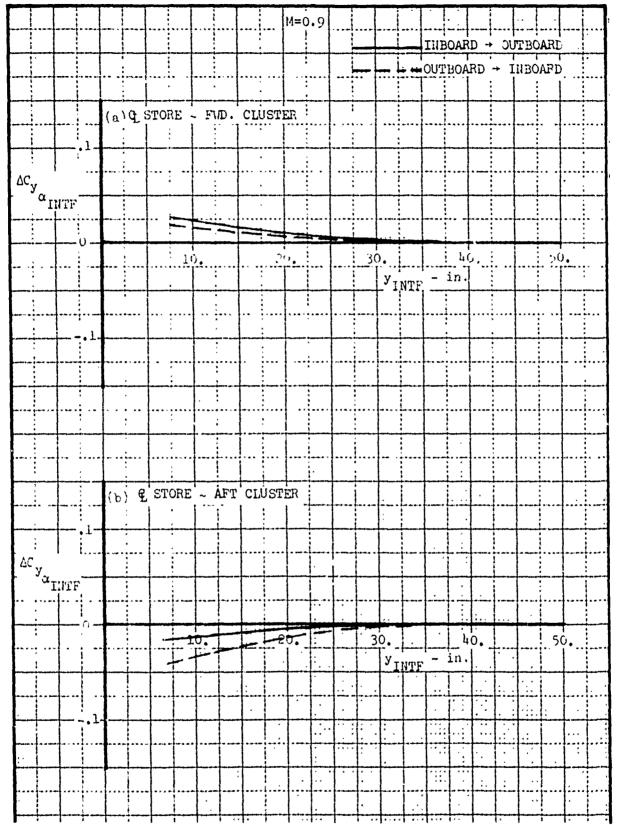


Figure 408. Incremental Side Force Slope Due to Interference - Centerline Store at M=0.9

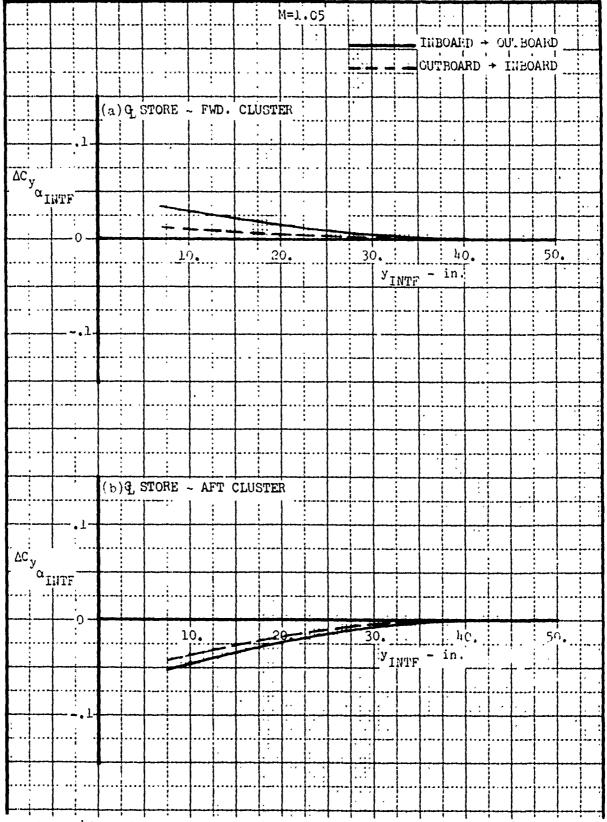


Figure 409. Incremental Side Force Slope Due to Interference - Centerline Store at M=1.05

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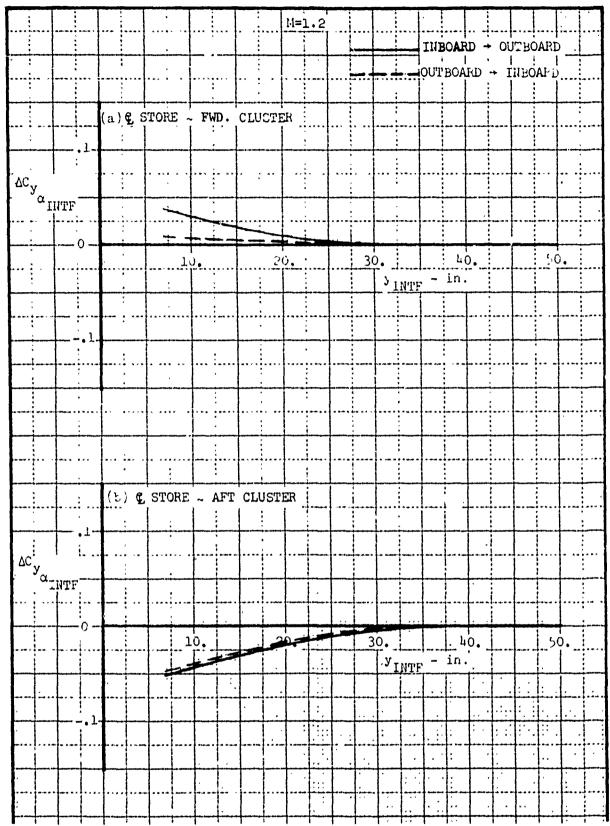


Figure 410. Incremental Side Force Slope Due to Interference - Centerline Store at M=1.2

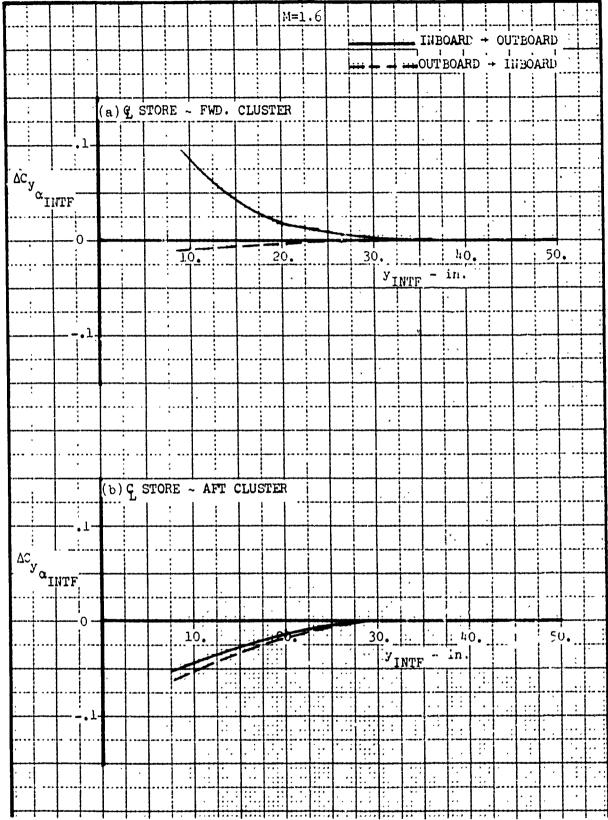


Figure 411. Incremental Side Force Slope Due to Interference - Centerline Store at M=1.6

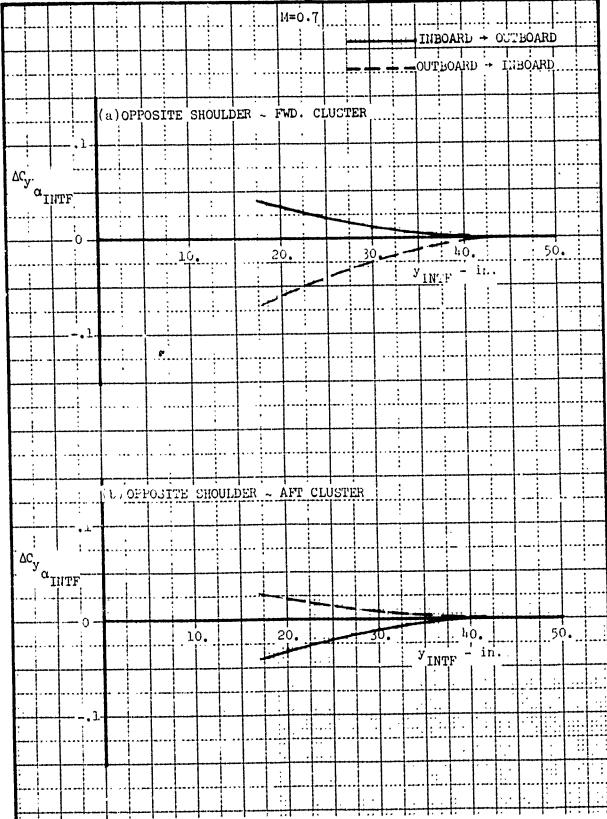


Figure 412. Incremental Side Force Slope Due to Interference - Opposite Shoulder at M = 0.7

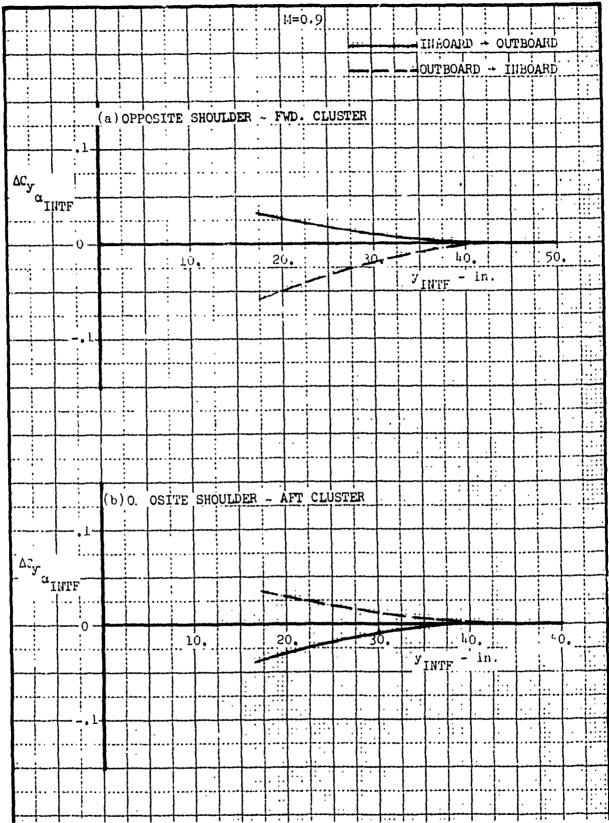


Figure 413. Incremental Side Force Slope Due to Interference - Opposite Shoulder at M=0.9

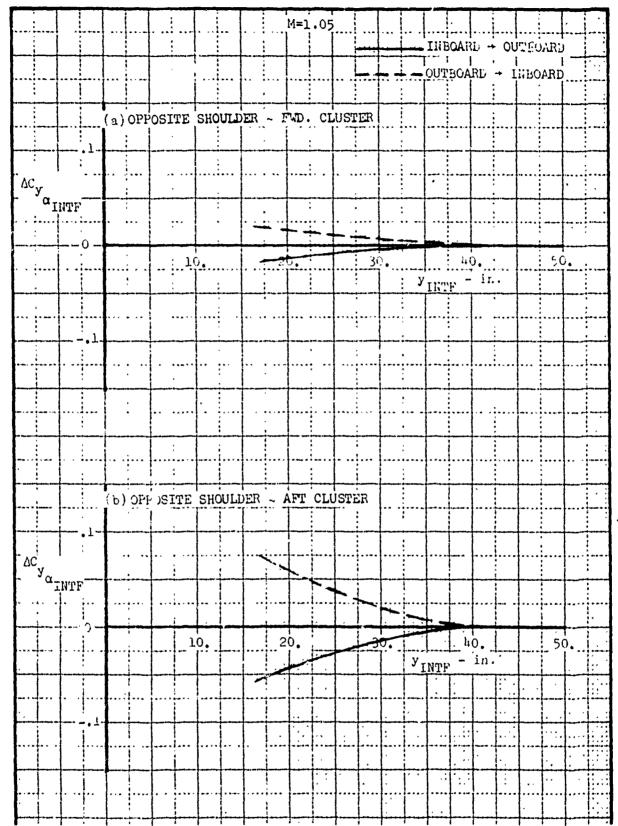


Figure 414. Incremental Side Force Slope Due to Interference - Opposite Shoulder at M=1.05

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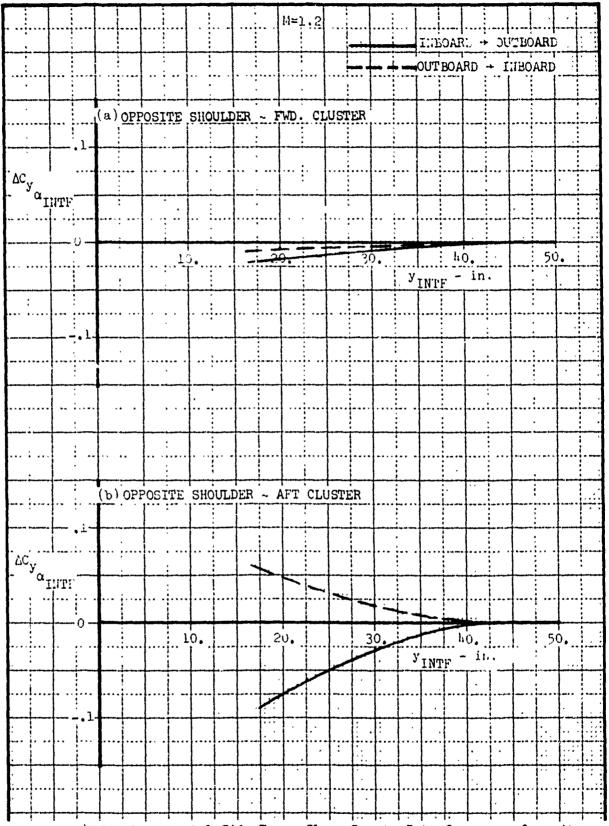


Figure 415. Incremental Side Force Slope Due to Interference - Opposite Shoulder at M=1.2

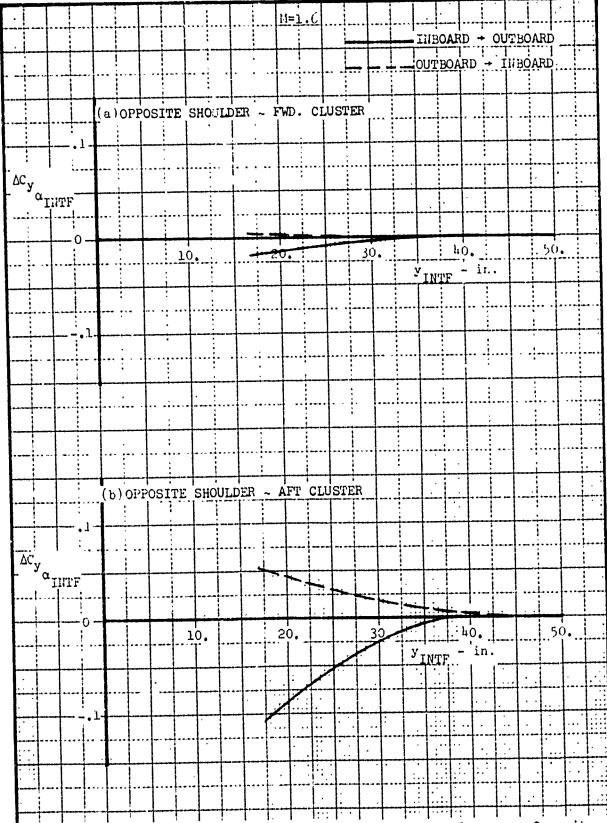
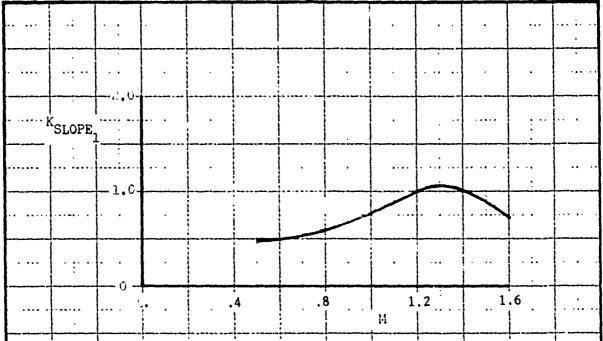


Figure 416. Incremental Side Force Slope Due to Interference - Opposite Shoulder at M=1.6



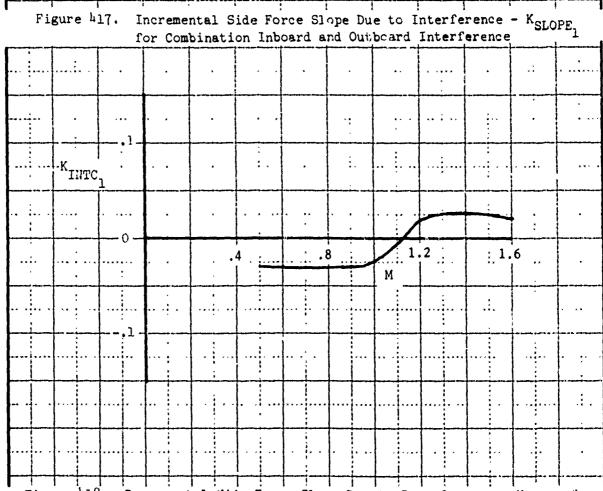


Figure 418. Incremental Side Force Slope Due to Interference - K_{INTC} for Combination Inboard and Outboard Interference

4.1.3.2 <u>Intercept Prediction</u>

The equations governing the prediction of incremental side force intercept are presented below.

INTERFERING STORES CARRIED INBOARD

MER STATIONS \pm , 2, 3, 4, 5, and 6 (MC1- ϵ):

AF A GIVEN MACH HUMBER:

$$\Delta \left(\frac{\text{SF}}{q}\right)_{\alpha=0} = \left(\sum \Delta \ C_{y_{\alpha=0}} \right) K_{\text{SCALL}_{SF}}.$$

$$\text{INTF}_{\text{MC1-G}} = \left(\sum \Delta \ C_{y_{\alpha=0}} \right) K_{\text{SCALL}_{SF}}.$$

$$\text{INTF}_{\text{IB+CB}}$$

$$\text{MS1-6}$$

wnere:

 $\kappa_{\text{SCALE}_{\text{SF}}}$ - Side force scale factor, ft² , see Section IV.

HITERFERING STORES CARRIED OUTBOARD

MIR STATIONS 1, 2, 3, 4, 5, and 6 (MS1-6):

AT A GIVEN MACH NUMBER:

$$\Delta \left(\frac{\text{SF}}{\text{q}}\right)_{\alpha=0} \left(\sum \Delta c_{y_{\alpha=0}}\right) K_{\text{SCALE}_{\text{SF}}} \\ \text{INTF} \\ \text{MS1-6} \quad \text{OB-IB}$$

where:

 $y_{\alpha=0}$ - Incremental side force intercept coefficient due to outboard to inboard interference as a OB+IB function of y_{INTF} , see Table 10.

 $K_{\text{SCALE}_{\text{SF}}}$ - Side force scale factor, ft², see Section IV.

INTERFERING STORES CARRIED INBOARD AND OUTBOARD

MER STATIONS 1, 2, 3, 4, 5, and 6 (MS1-6):

AT A GIVEN MACH NUMBER:

$$\Delta\left(\frac{\text{SF}}{q}\right)_{\alpha=0} = \left[K_{\text{INTC}_2} + K_{\text{SLOPE}}\left(\sum\Delta C_{y_{\alpha=0}} + \sum\Delta C_{y_{\alpha=0}}\right)\right] K_{\text{SCALE}_{\text{JF}}}$$

$$\frac{\text{INTF}}{\text{MS1-6}} = \left[K_{\text{INTC}_2} + K_{\text{SLOPE}}\left(\sum\Delta C_{y_{\alpha=0}} + \sum\Delta C_{y_{\alpha=0}}\right)\right] K_{\text{SCALE}_{\text{JF}}}$$

$$\frac{\text{INTF}}{\text{IB+OB}} = \frac{\text{OB+IB}}{\text{MS1-6}}$$

where:

- Intercept for the inboard-outboard combination correction for side force intercept, Figure 435.

K_{SLOPE}, - Slope for the inboard-outboard combination correction for side force intercept, Figure 4:34.

ΔC - Previously defined.

INTF
IB+OB

ΔC - Previously defined.

Yα=0
INTF
OB+18

 $K_{\text{SCALE}_{\text{SF}}}$ - Side force scale factor, ft², see Section IV.

The above equations define the interference increment calculation at a given Mach number. For Mach numbers other than those presented, M = 0.7, 0.9, 1.05, 1.2, 1.6, these guidelines should be followed. If the subject Mach number is less than M = 0.7

use the value at M = 0.7. For other Mach numbers linear interporation should be used between the Mach numbers which are presented.

TABLE 10. INCREMENTAL SIDE FORCE INTERCEPT COEFFICIENT DUE TO INTERFERENCE - FIGURE LOCATION GUIDE

					
		142	ACH NUMBER		
ΔC y _{α=0}	0.7	0.9	1.05	12	1.6
INTF					
		Fig	gure Hamber		
Adj. Shoulder-					
Fwd. Cluster	419	p50	401	****	1. 2
Adj. Shoulder-	4				
Aft Cluster	hyo	420	h21	:.	423
g Store-					
Fwd. Cluster	h2h	1:25	1:26	4.7	1
£ Store-					
Aft Cluster	424	425	436	427	٩٠ ،،
Opposite Shoulder-					
Fwd. Cluster	429	h30	1, 31	h 3.	7:33
Opposite Shoulder-					•
Aft Cluster	h29	430	1131	431	1, 2 -
1	h29	430	p.3.7	43 7	** ·

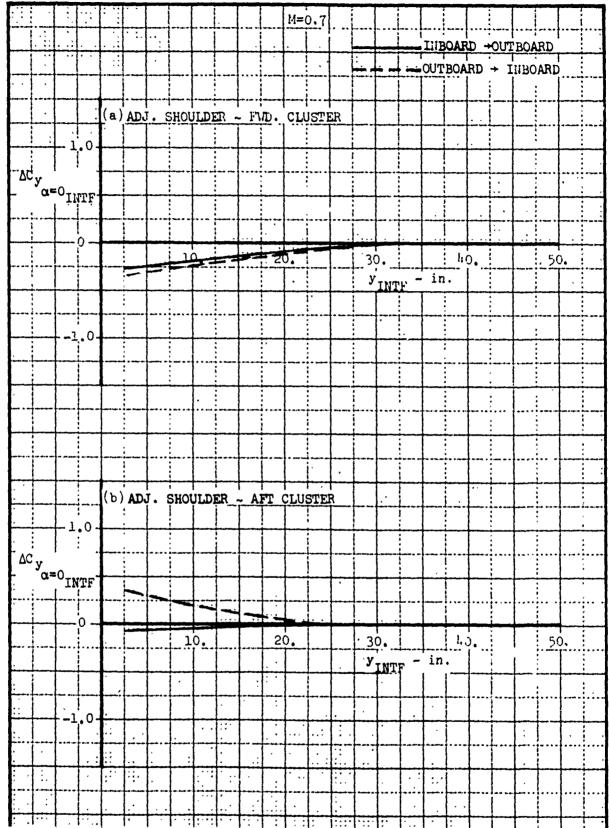


Figure 419. Incremental Side Force Intercept Due to Interference - Adjacent Shoulder at M=0.7

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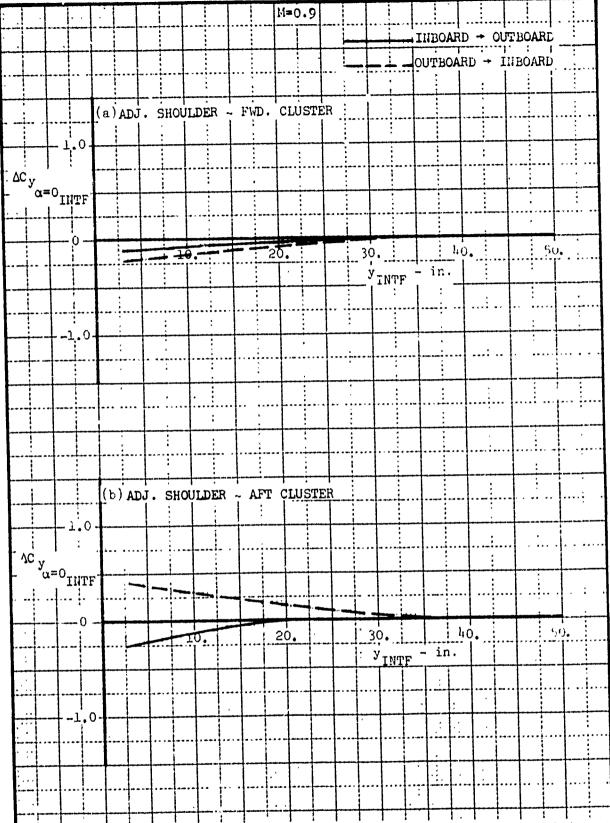


Figure 420. Incremental Side Force Intercept Due to Interference - Adjacent Shoulder at M=0.9

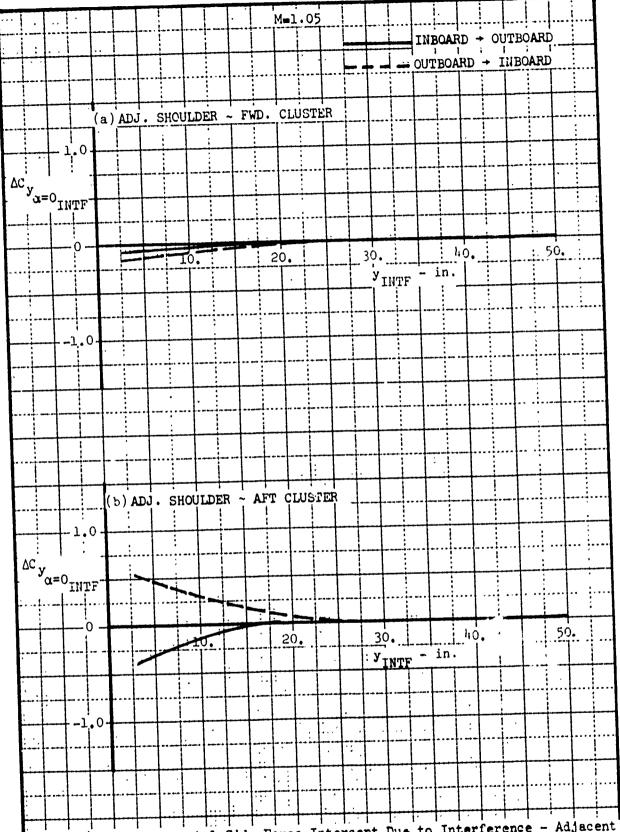


Figure 421. Incremental Side Force Intercept Due to Interference - Adjacent Shoulder at M=1.05

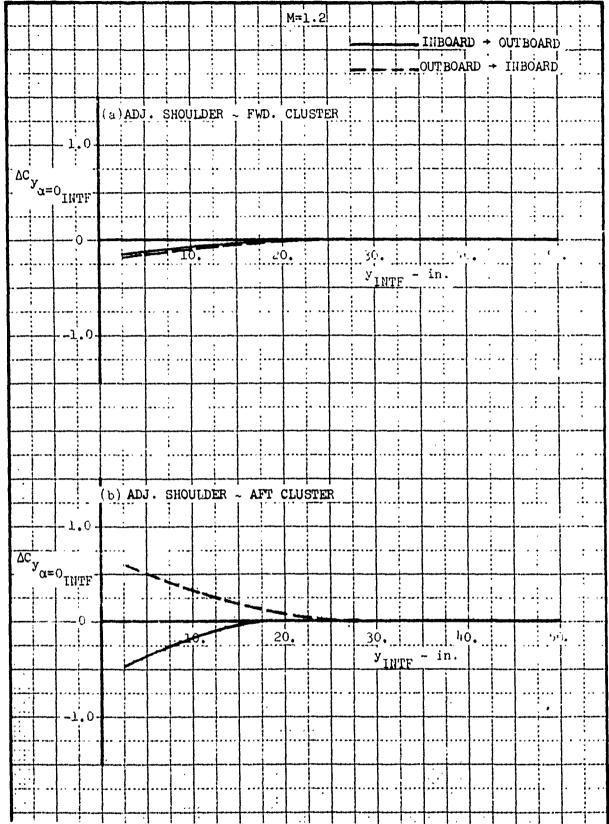


Figure 422. Incremental Side Force Intercept Due to Interference - Adjacent Snoulder at M=1.2

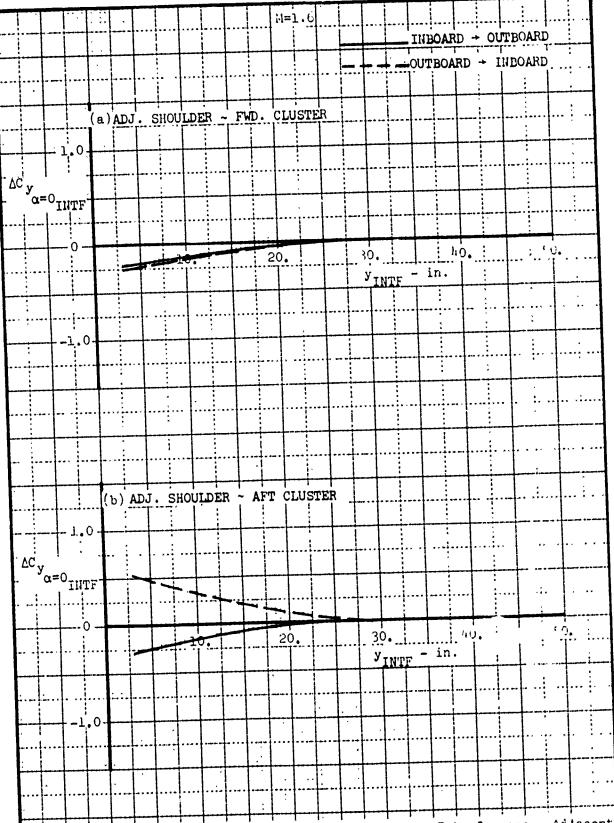


Figure 423. Incremental Side Force Intercept Due to Interference - Adjacent Shoulder at M=1.6

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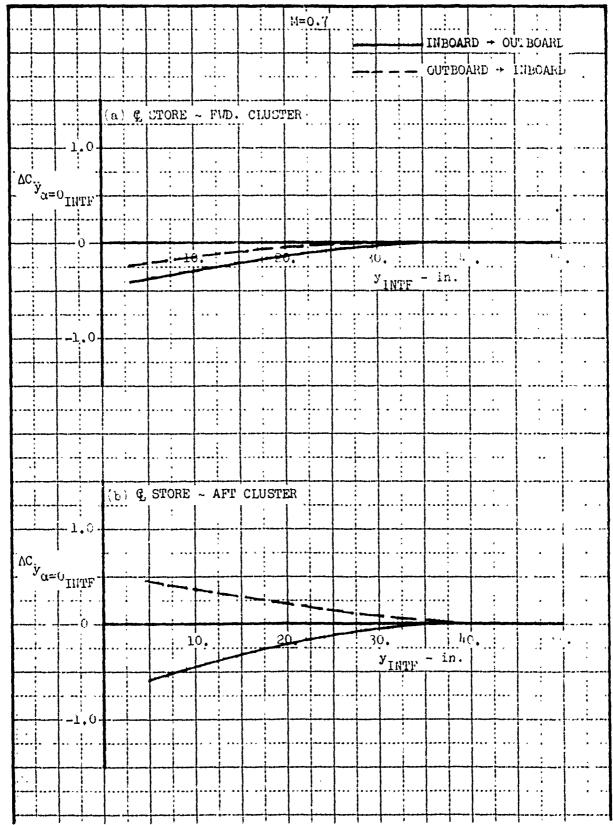


Figure 424. Incremental Side Force Intercept Due to Interference - Centerline Store at M=0.7

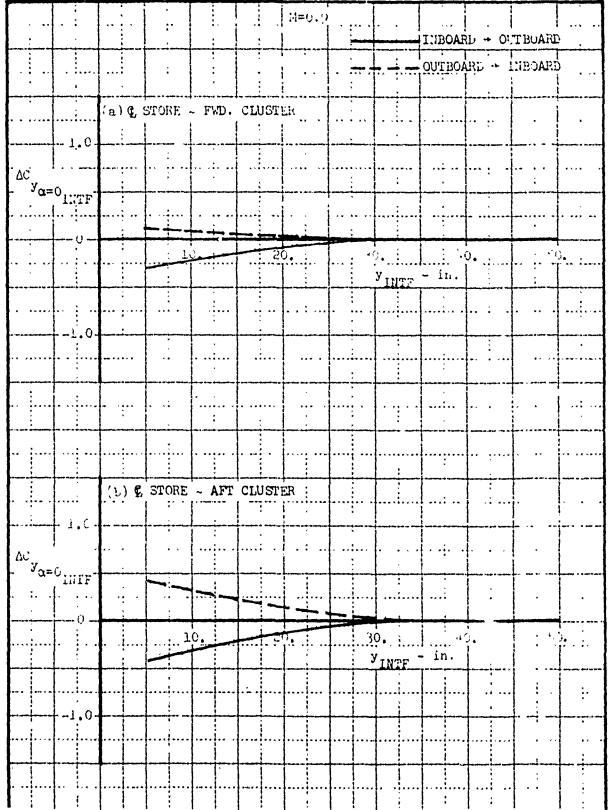


Figure 425. Incremental Side Force Intercept Due to Interference - Centerline Store at M=0.9

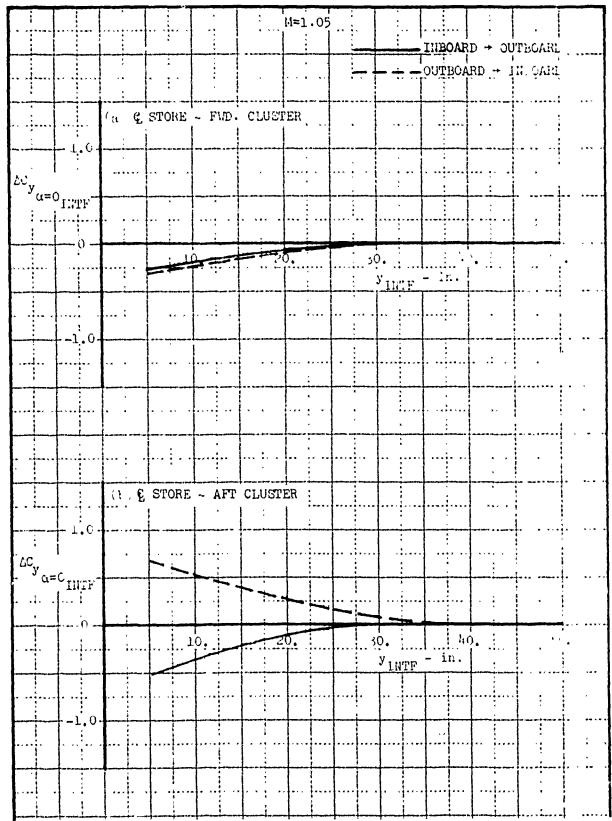


Figure 420. Incremental Side Force Intercept Due to Interference - Centerline Store at M=1.0)

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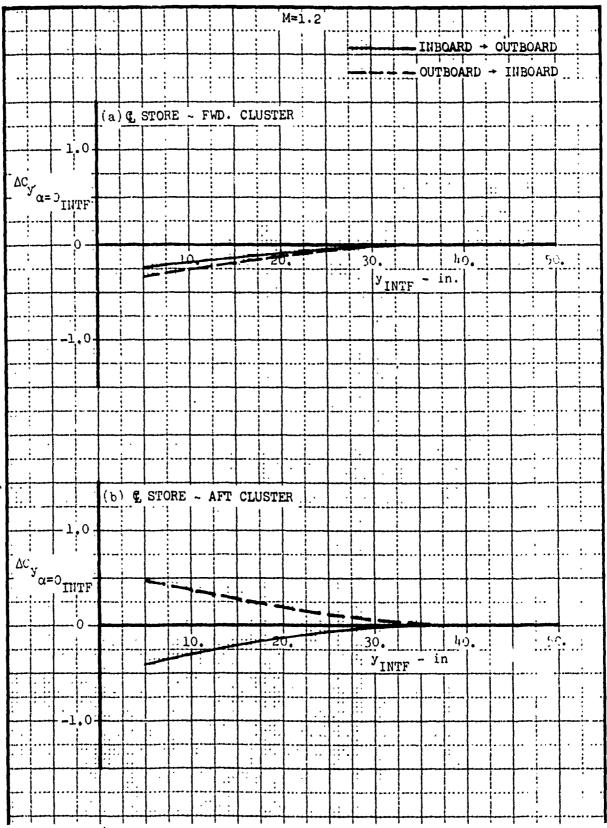


Figure 427. Incremental Side Force Intercept Due to Interference - Centerline Store at M=1.2

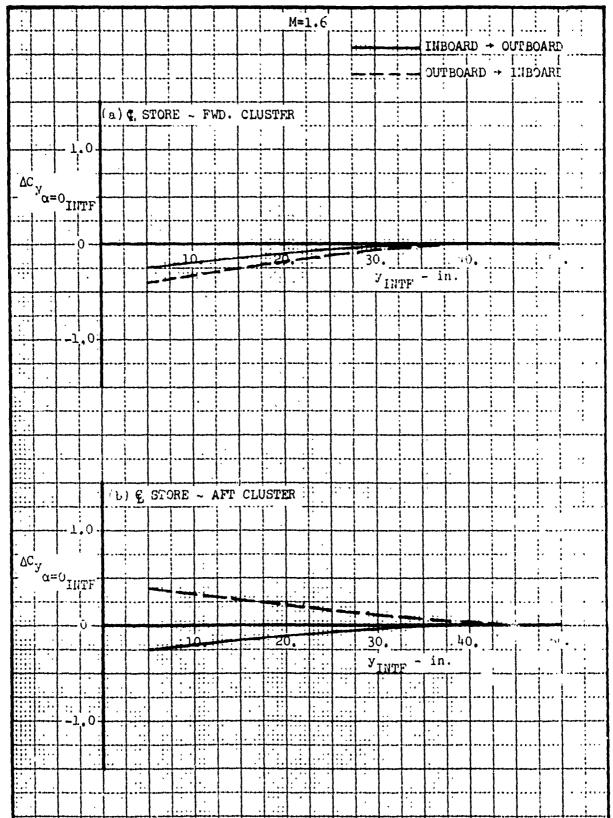


Figure 428. Incremental Side Force Intercept Due to Interference - Centerline Store at M=1.6

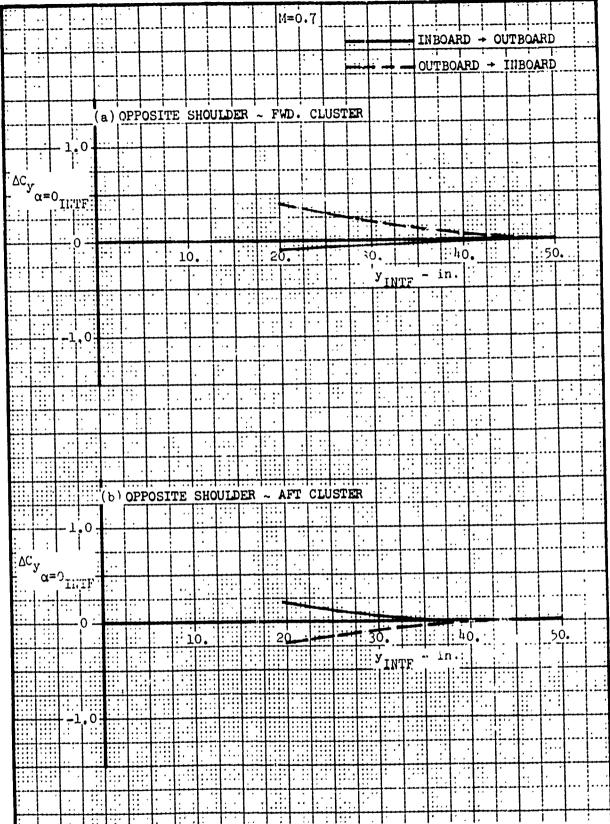


Figure 429. Incremental Side Force Intercept Due to Interference - Opposite Shoulder at M=0.7

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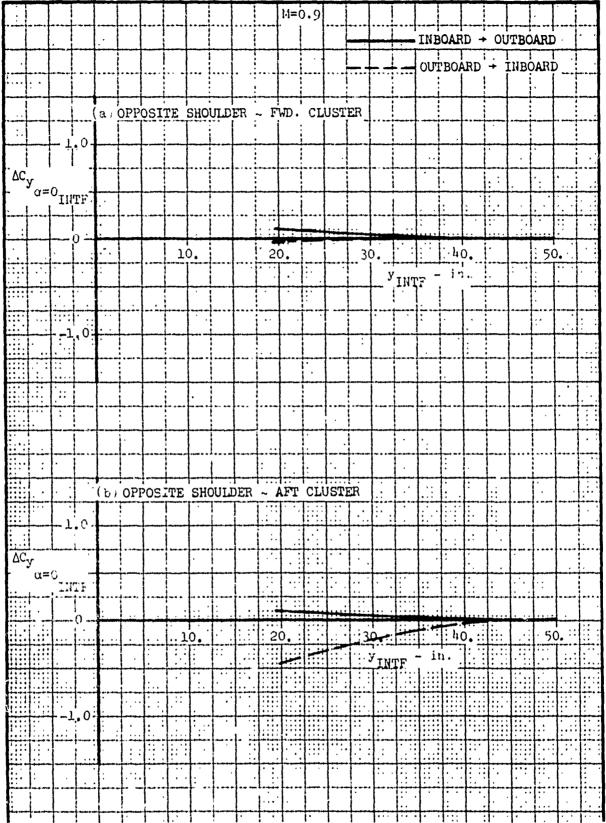


Figure 430. Incremental Side Force Intercept Due to Interference - Opposite Shoulder at M=0.9

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Figure 431. Incremental Side Force Intercept Due to Interference - Opposite Shoulder at M=1.05

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Figure 432. Incremental Side Force Intercept Due to Interference - Opposite Shoulder at M=1.2

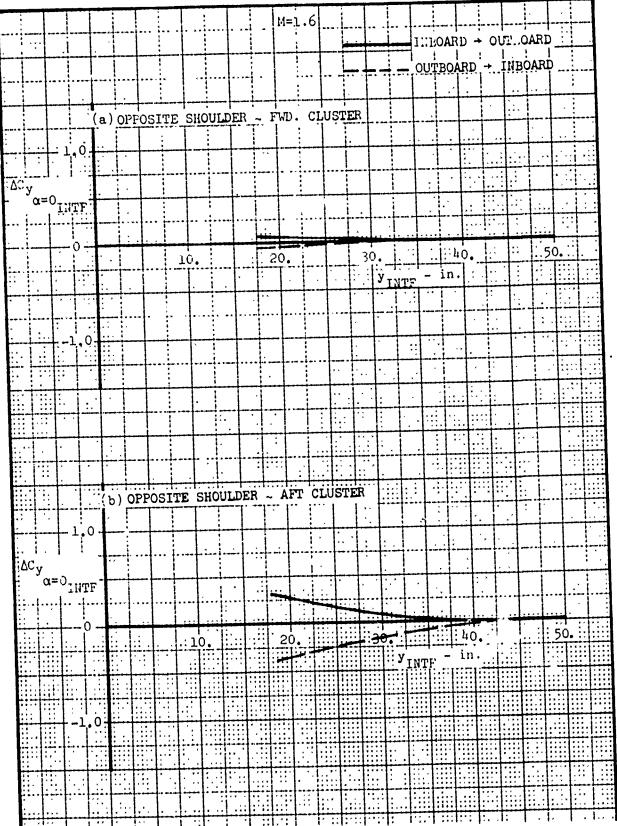


Figure 433. Incremental Side Force Intercept Due to Interference - Opposite Shoulder at M=1.6

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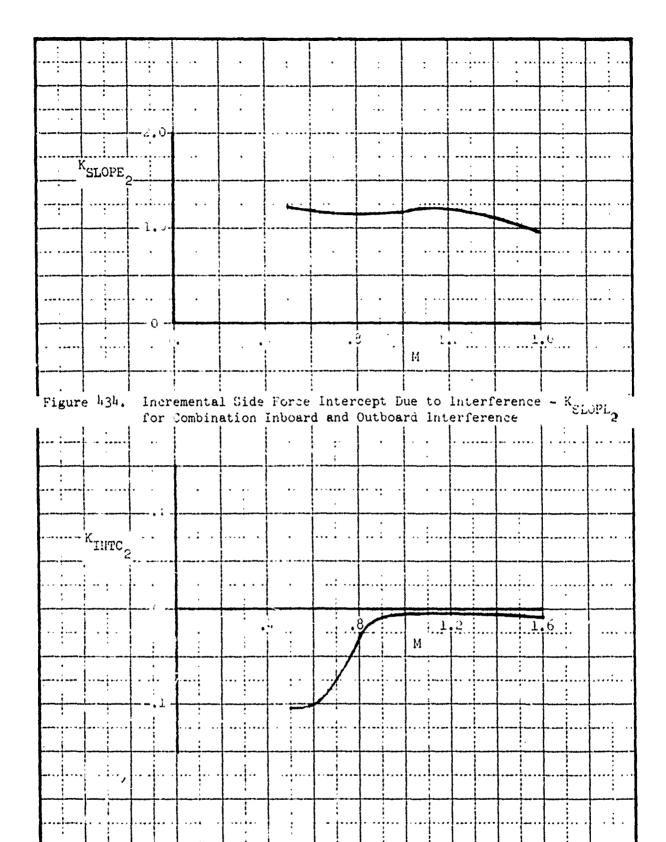


Figure 435. Incremental Side Force Intercept Due to Interference - KINTC 2

4.2 YAWING MOMENT

4.2.1 Basic Airload

The basic yawing moment data were generated by a zero yaw pitch excursion of the parent aircraft. The data are referenced along the store centerline at the mid-lug location of each ejector unit. Under each subsequent subsection the prediction method is separated to apply to fuselage centerline-mounted stores and to wing pylon-mounted stores.

4.2.1.1 Slope Prediction

The variation of captive store yawing moment with angle of attack when the store is installed on a MER at M=0.5 is defined by the following relationships.

FUSELAGE CENTERLINE-MOUNTED STORES

MER Stations 1 and 2 (MS1,2):

$$\left(\frac{YM}{q}\right)_{\alpha}$$
 = 0 By symmetry PRED MS1,2

MER Stations 3, 4, 5, and 6 (MS3-6):

$$\left(\frac{\text{YM}}{\text{q}}\right)_{\alpha}$$
 = S_{REF} ℓ_{REF} $C_{\eta_{\alpha}q_{\perp}}$ = $f(d)$

PRED

MS3-6

MS3-6

where:

- Fuselage centerline captive store yawing moment variation with angle of attack, $\frac{1}{\deg}$, presented as a function of store diameter.

MER STA 3 - Figure 436

MER STA 4 - Figure 436

MER STA 5 - Figure 436

MER STA 6 - Figure 436

$$S_{REF}$$
 - Store reference area, $\frac{\pi d^2}{4}$, ft ²

2 REF - Store reference length, d, ft.

WING-MOUNTED STORES

MER Station 1 (MS1):

$$\left(\frac{\text{YM}}{q}\right)_{\alpha} = K_{\Lambda_{1}} K_{\eta} K_{\overline{Z}} K_{C_{YM}} \left(\frac{\text{SF}}{q}\right)_{\psi}$$
PRED MS1 MS1 TS0

where:

 K - Aircraft wing sweep correction factor based on the sweep angle, Λ, of the quarter-chord, $\frac{\sin \Lambda}{\sin h 5^{\circ}}$.

Correction factor based on semispan location, Figure 437.

 $\frac{K_{\overline{Z}}}{\overline{C}_{MS1}}$ - Pylon height correction factor, Figure 439.

 $K_{C_{YIJ}}$ $\frac{(SF)_{\psi}}{Q}_{\psi}$ - Initial pitching moment slope prediction, $\frac{ft^{-3}}{deg}$, MS1 ISO see Subsection 2.3.3.

MER Station 2 (MS2):

$$\left(\frac{\text{YM}}{\text{q}}\right)_{\alpha} = K_{\Lambda_{1}} K_{\eta_{MS2}} K_{LE_{F}} K_{C_{YM}} \left(\frac{\text{SF}}{\text{q}}\right)_{\psi}$$

$$K_{S2} K_{MS2} K_{MS2} K_{LE_{F}} K_{C_{YM}} K_{MS2} K_{LE_{F}} K_{C_{YM}} K_{C_$$

where:

K - Aircraft wing sweep correction factor, $\frac{\sin \Lambda}{\sin 45^{\circ}}$.

Correction factor based on semispan location, Figure 437.

Correction factor based on store longitudinal location, Figure 438.

$$K_{C_{YM}}$$
 $(\frac{SF}{q})_{\psi}$ - initial pitching moment slope prediction, $\frac{ft}{MS2}$ TSO $\frac{ft}{deg}$, see Subsection 2.3.3.

MER Station 3, 4, 5, 6 (MS3-6):

where:

 $K_{C_{YM}}$ $\frac{(SF)}{q}_{\psi}$ - Initial yawing moment prediction, $\frac{ft^{-3}}{deg}$, see MS1 ISO Subsection 2.3.3. $K_{C_{YM}}$ to be used should be MS2 MS1 for MS3,5 and MS2 for MS4,6.

κ_{Λι} - Aircraft wing sweep correction factor, $\frac{\sin \Lambda}{\sin 45}$.

K_{SCALE_{YM}} - Yawing moment scale factor, ft.3, see Section IV.

 $\Delta C_{\eta_{\alpha}}$ - Incremental yawing moment slope coefficient · for the shoulder stations, $\frac{1}{\deg}$.

MER STA 3 - Figure 440

MER STA 4 - Figure 441

MER STA 5 - Figure 440

MER STA 6 - Figure 441

Example: Calculate the variation of yawing moment with angle contack. for an M117 store on MER STA 6 carried on the A-7 center pylon at M=0.5.

Required for Computation:

$$C_{LOCAL} = 127.6 \text{ in.}$$
 $K_{\Lambda_1} = \frac{\sin 35^{\circ}}{\sin 45^{\circ}} = .811$

$$\left(\frac{\text{SF}}{q}\right)\psi$$
 = .114 ft²

 $SPA = 1200 in^{-2}$

$$K_{\text{SCALE}_{YM}} = \frac{\left(\frac{\text{SF}}{q}\right) \psi_{\text{ISO}}}{71.4} = \frac{(.114)(1200)}{71.4} = 1.92 \text{ ft}^3$$

$$K_{C_{YM}} \left(\frac{SF}{q}\right)_{\psi} = -.088 \frac{ft^3}{deg}$$
, Subsection 2.3.3

$$\Lambda C_{\eta_{\alpha}} = -.011 \frac{1}{\text{deg}}, \text{ Figure 441}$$
MS6

$$\left(\frac{\text{YM}}{\text{q}}\right)_{\alpha}$$
 = (.811)(-.088) + (1.92)(-.011) = -.092 $\frac{\text{ft}^3}{\text{deg}}$

PRED
MS6

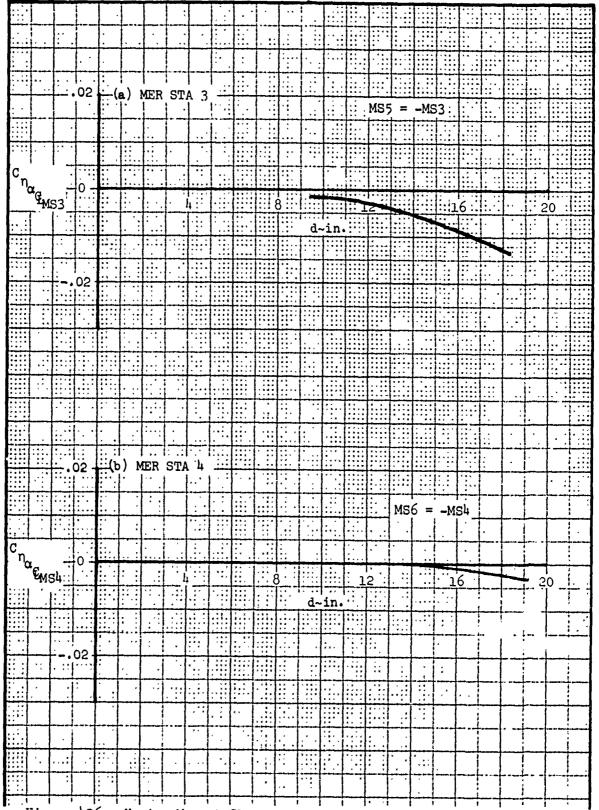


Figure 436. Yawing Moment Slope - Stores Mounted on Fuselage Centerline, MER Stations 3-6

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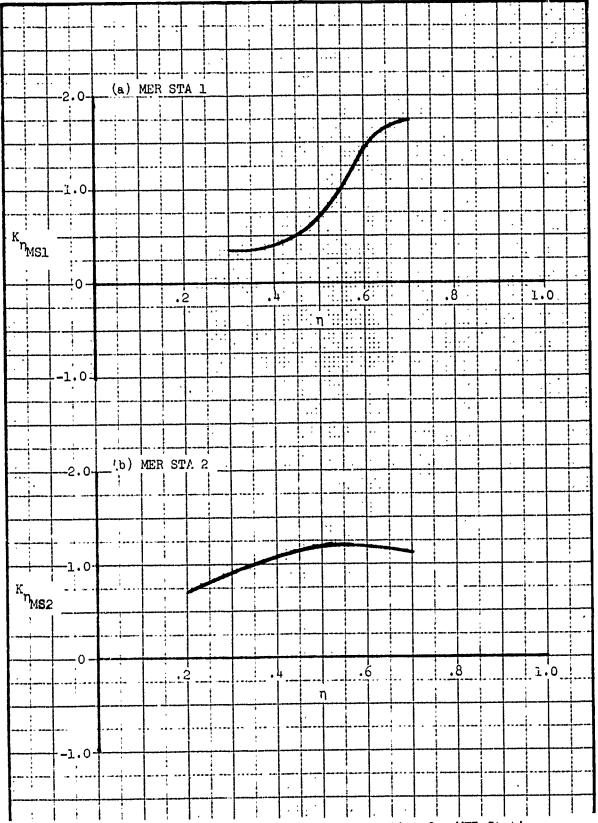
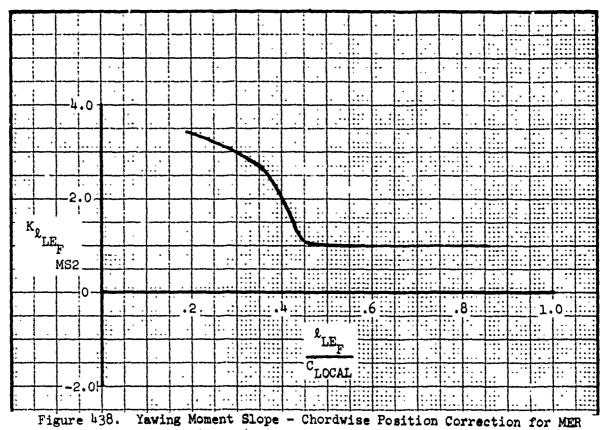


Figure 437. Yawing Moment Slope - Spanwise Correction for MER Stations 1 and 2

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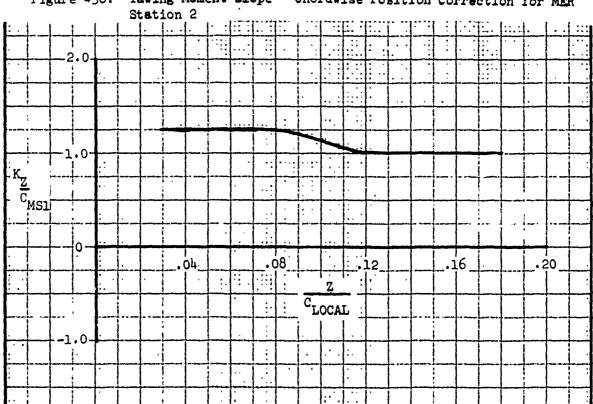


Figure 439. Yawing Moment Slope - Pylon Height Correction for MER Station 1

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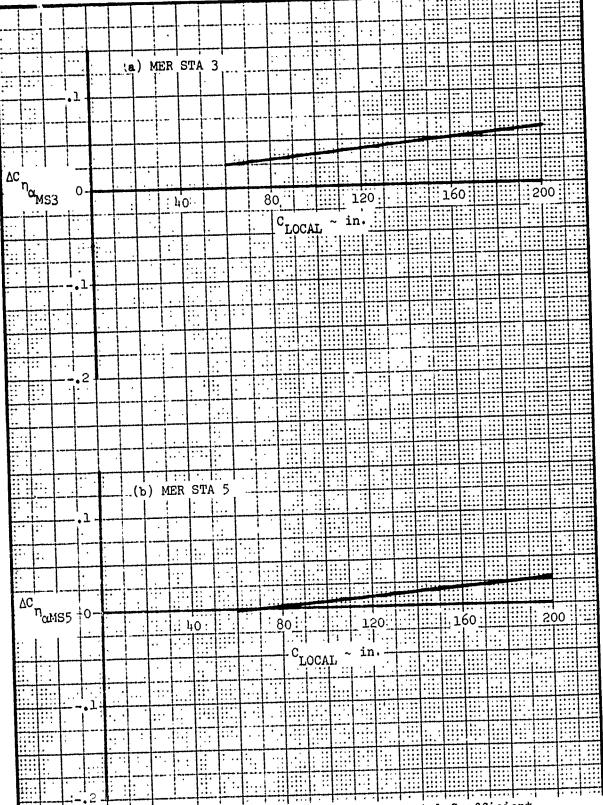
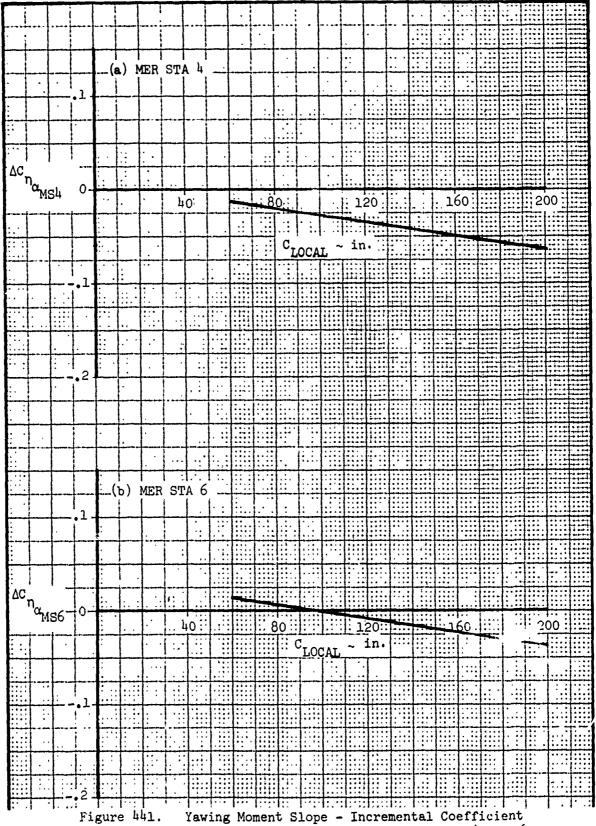


Figure 440. Yawing Moment Slope - Incremental Coefficient for Wing Mounted Stores, MER Stations 3 and 5



Yawing Moment Slope - Incremental Coefficient for Wing Mounted Stores, MER Stations 4 and 6

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4.2.1.2 Slope Mach Number Correction

To compute the variation in captive store yawing moment slope with angle of attack, $\left(\frac{YM}{q}\right)_{\alpha}$, between M=0.5 and M=1.6, use the following expression.

$$\left(\frac{\text{YM}}{\text{q}}\right)_{\alpha} = \left(\frac{\text{YM}}{\text{q}}\right)_{\alpha} + \Delta \left(\frac{\text{YM}}{\text{q}}\right)_{\alpha}$$

M=x

PRED

M=x

where:

$$\Delta \left(\frac{YM}{q}\right)_{\alpha} - \text{Increment in yawing moment slope at M=x, } \frac{\text{ft}^3}{\text{deg}} \; .$$
 M=x

$$\left(\frac{\text{YM}}{\text{q}}\right)_{\alpha}$$
 - Predicted yawing moment slope at M=0.5, Subsection FRED 4.2.1.1, $\frac{\text{ft}^3}{\text{deg}}$

FUSELAGE CENTERLINE-MOUNTED STORES

MER Stations 1 and 2 (MS1,2):

$$\Delta \left(\frac{YM}{q}\right)_{\alpha} = 0$$
 by symmetry M=x MS1,2

MER Stations 3, 4, 5 and 6 (MS3-6):

$$\Delta \left(\frac{YM}{q}\right)_{\alpha} = K_{SCALE_{YM}} \Delta C_{\eta_{\alpha}} = f(M)$$

$$MS3-6 MS3-6$$

where:

- Incremental yawing moment slope coefficient as

a function of Mach number, $\frac{1}{\deg}$.

MER STA 3 - Figure 442

MER STA 5 - Figure 442

MER STA 6 - Figure 442

K_{SCALE</sup>YM - Yawing moment scale factor, ft 3, see Section IV.}

WING-MOUNTED STORES

The generalized curve of the variation of $\left(\frac{YM}{q}\right)_{\alpha}$ with Mach number is given by Figure 61 in Subsection 3.2.1.2. The variation of yawing moment slope with Mach number is approximated by a series of linear segments. Each Mach number at which the line segments change slope is designated a break point. The initial break point, M_o, is defined as the Mach number at which the value of $\left(\frac{YM}{q}\right)_{\alpha}$ deviates from the subsonic M=0.5 value. The variation of the Mach break points (M_o, M_1, M_2, M_3) is presented in Figures 443 through 445 as a function of C_{LOCAL} and/or K_{Λ_1} . The variation of C_{η} with Mach number between break points for each MER station is presented in Figures 446 through 454. The expressions below define the calculation procedures for each MER Station over the applicable Mach range.

Break 1
$$(M_1)$$
: $M_0 \le x \le M_1$

MER Station 1, 2, 3, 4, 5 and 6 (MS1-6):

$$\Delta \left(\frac{\text{YM}}{\text{q}}\right)_{\alpha} = \begin{bmatrix} \left(x-\text{M}_{0}\right) & \text{K}_{\text{SLOPE}_{1}} \\ \text{MS1-6} \end{bmatrix} \text{K}_{\text{SCALE}_{\text{YM}}}$$

where:

"SLOPE1" - The variation of C_{η} with Mach number between M_0 and M_1 , $\frac{1}{\deg}$.

MER STA 1 - Figure 446

MER STA 2 - Figure 446

MER STA 3 - Figure 447

MER STA 4 - Figure 448

MER STA 5 - Figure 447

MER STA 6 - Figure 448

K_{SCALE_{YM}} - Yawing moment scale factor, ft³, see Section IV.

Break 2 (M_2) : $M_1 \le x \le M_2$

MER Station 1, 2, 3, 4, 5 and 6 (MS1-6):

$$\Delta \left(\frac{\text{YM}}{\text{q}}\right)_{\alpha} = \left[\left(\text{M}_{1}^{-\text{M}_{0}}\right) \text{K}_{\text{SLOPE}_{1}} + \left(\text{x-M}_{1}\right) \text{K}_{\text{SLOPE}_{2}} \\ \text{MS1-6} + \left(\text{K}_{\text{SCALE}_{\text{YM}}}\right) \right].$$

K_{SLOPE}, - Defined under Break 1.

 $^{K}\text{SLOPE}_{2}$ - The variation of $^{C}\eta_{\alpha}$ with Mach number between $^{M}\text{1}$ and $^{M}\text{2}, \frac{1}{\text{deg}};$

MER STA 1 - Figure 449

MER STA 2 - Figure 449

MER STA 3 - Figure 450

MER STA 4 - Figure 451

MER STA 5 - Figure 450

MER STA 6 - Figure 451

 $K_{\text{SCALE}_{\text{YM}}}$ - Yawing moment scale factor, ft³, see Section IV.

Break 3 (M_3): $M_2 \le x \le M_3$

MER Station 4 has only two break points between M=0.5 and M=1.6 MER Stations 2 and 6 (MS2,6):

$$\Delta \left(\frac{\text{YM}}{\text{q}}\right)_{\alpha} = \begin{bmatrix} \left(\text{M}_{1}^{-\text{M}_{0}}\right) & \text{K}_{\text{SLOPE}_{1}} & + \left(\text{M}_{2}^{-\text{M}_{1}}\right) & \text{K}_{\text{SLOPE}_{2}} \\ \text{MS2,6} & \text{MS2,6} & \text{MS2,6} \end{bmatrix} + \left(\text{M}_{2}^{-\text{M}_{1}}\right) & \text{K}_{\text{SLOPE}_{2}} \\ + \left(\text{M}_{2}^{-\text{M}_{2}}\right) & \text{K}_{\text{SLOPE}_{3}} & \text{MS2,6} \end{bmatrix} \times \text{SCALE}_{\text{YM}}$$

where:

 K_{SLOPE_1} - Defined under Break 1

K_{SLOPE} - Defined under Break 2

 $^{K}\text{SLOPE}_{3}$ - The variation of $^{C}\eta_{\alpha}$ with Mach number between $^{M}\text{2}$ and $^{M}\text{3}$, $\frac{1}{\text{deg}}$.

MER STA 2 - Figure 452 MER STA 6 - Figure 454

 $^{\rm K}_{\rm SCALE_{\rm YM}}$ - Yawing moment scale factor, ft $^{\rm 3}$, see Section IV.

MER Stations 1, 3 and 5 (MS1,3,5):

$$\Delta \left(\frac{\text{YM}}{\text{q}}\right)_{\alpha} = \begin{bmatrix} \left(\text{M}_{1}\text{-M}_{0}\right) & \text{K}_{\text{SLOPE}_{1}} & + \left(\text{M}_{2}\text{-M}_{1}\right) & \text{K}_{\text{SLOPE}_{2}} \\ & \text{MS1,3,5} & & \text{MS1,3,5} \end{bmatrix}$$

$$+ \left(\text{x-M}_{2}\right) \left(\text{K}_{\text{SLOPE}_{3}} & + \Delta \text{K}_{\text{SLOPE}_{3}} \right) \begin{bmatrix} \text{K}_{\text{SCALE}_{\text{YM}}} \\ & \text{MS1,3,5} \end{bmatrix}$$

$$+ \Delta \text{K}_{\text{SLOPE}_{3}} & + \Delta \text{K}_{\text{SLOPE}_{3}} \\ & \text{MS1,3,5} & \text{MS1,3,5} \end{bmatrix}$$

where:

 $K_{SLOPE_{\eta}}$ - Defined under Break 1.

K_{SLOPE} - Defined under Break 2.

 $^{K}_{SLOPE_{3}}$ - The variation of $^{C}_{\eta_{\alpha}}$ with Mach number between $^{M}_{2}$ and $^{M}_{3},\,\frac{1}{\text{deg}}$.

MER STA 1 - Figure 452

MER STA 3 - Figure 453

MER STA 5 - Figure 453

 $\Delta K_{\text{SLOPE}_3}$ - Increment to K_{SLOPE_3} for the aft cluster based on AFT η^{\dagger} , $\frac{1}{\text{deg}}$, Figure 455.

 $^{\rm K}_{\rm SCALE_{\rm YM}}$ - Yawing moment scale factor, ft³, see Section IV.

Example:

Required for Computation:

 $C_{LOCAL} = 127.6 in.$

$$K_{A_1} = \frac{\sin 35^{\circ}}{\sin 45^{\circ}} = .811$$

K_{SCALE_{YM}} = 1.92 ft.³ - Subsection 4.2.1.1

$$K_{\text{SLOPE}_{1}} = -.057 \frac{1}{\text{deg}} - \text{Figure 448}$$
MS6

$$\Delta \left(\frac{\text{YM}}{\text{q}}\right)_{\alpha} = \left[\left(0.8-0.5\right) \left(-.057\right) \right] \quad 1.92 = -.033 \frac{\text{ft}^3}{\text{deg}} .$$
MS6

$$\left(\frac{\text{YM}}{\text{q}}\right)_{\alpha}$$
 = -.092 $\frac{\text{ft.}^3}{\text{deg.}}$ - Pubsection 4.2.1.1 PRED MS6

$$\left(\frac{\text{YM}}{\text{q}}\right)_{\alpha} = -.092 - .033 = -.125 \frac{\text{ft}^3}{\text{deg}}$$
.

M=.8

MS6

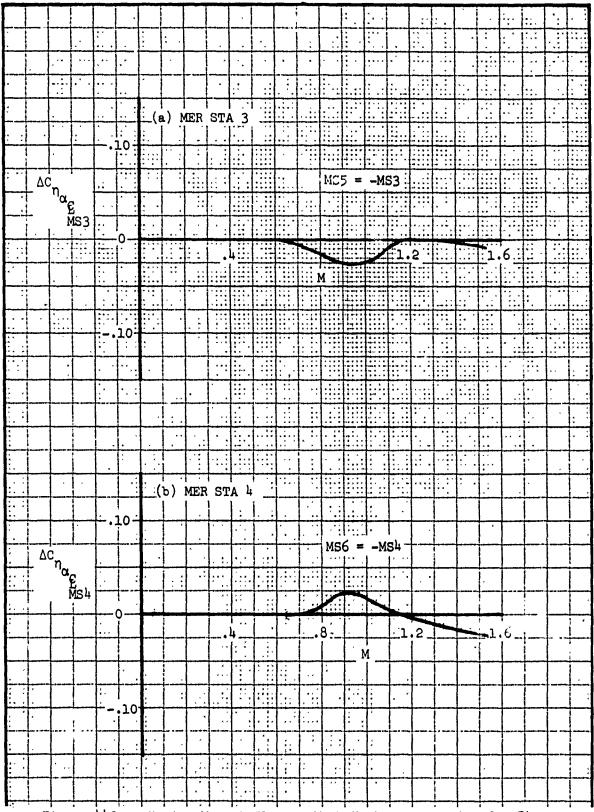


Figure 442. Yawing Moment Slope - Mach Number Correction for Stores Mounted on Fuselage Centerline, MER Stations 3-6

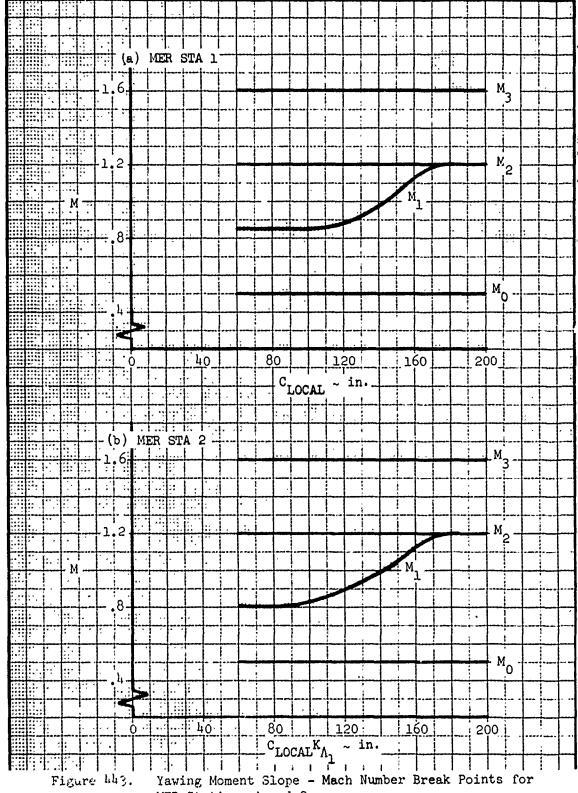
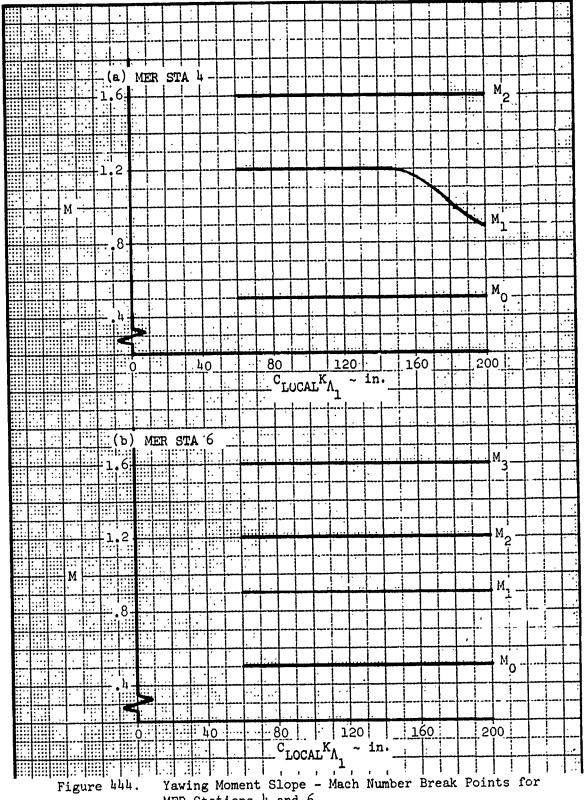


Figure 443. MER Stations 1 and 2



MER Stations 4 and 6

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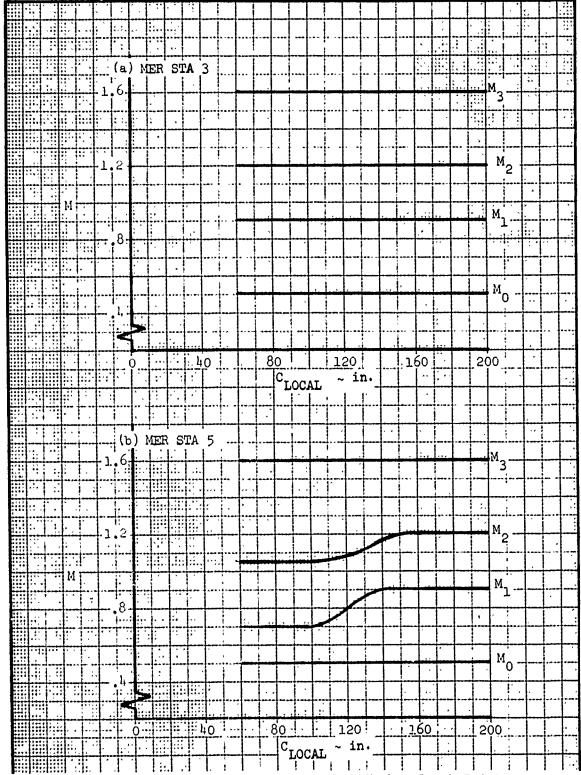
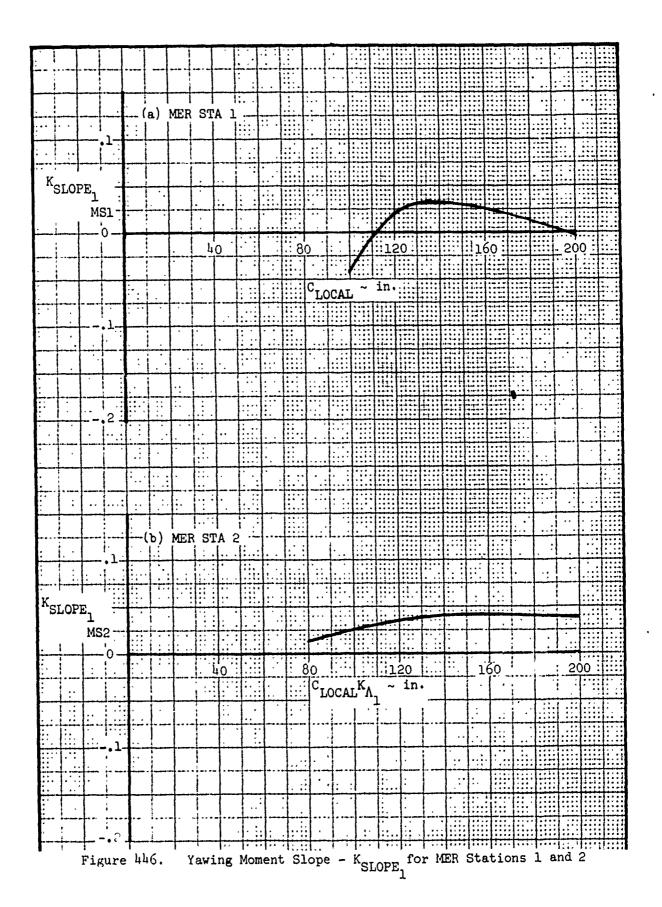
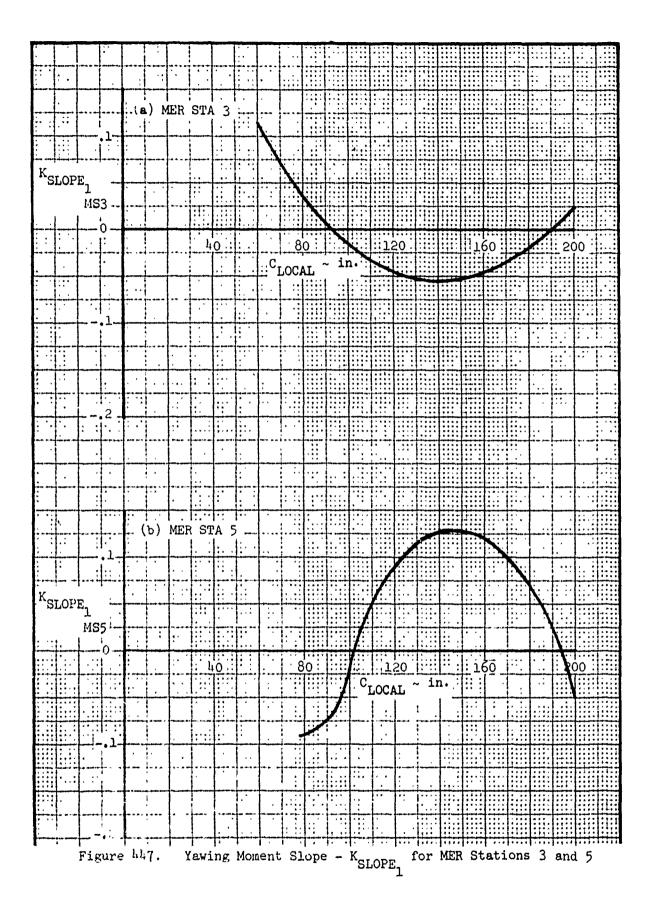
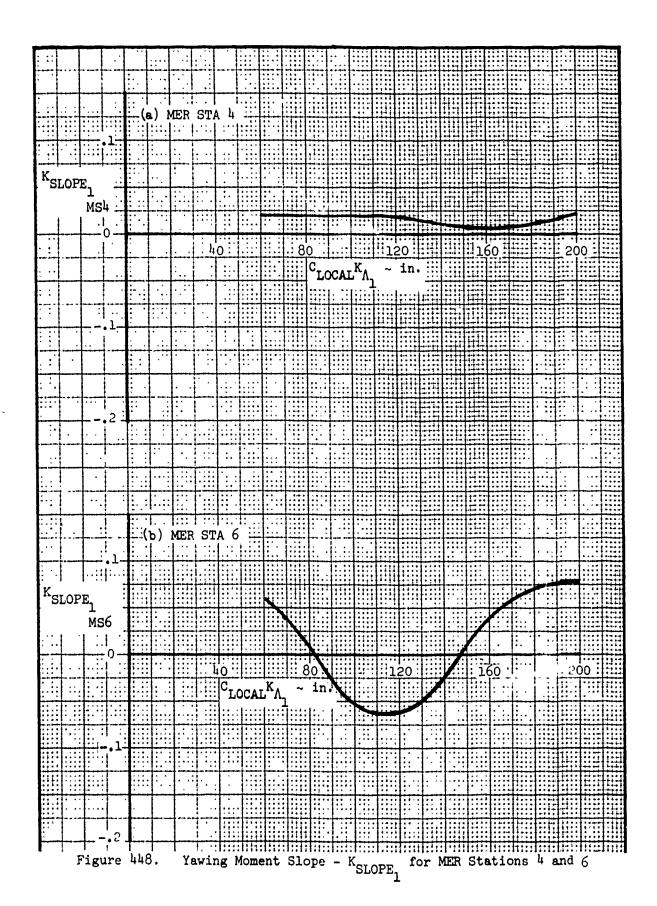


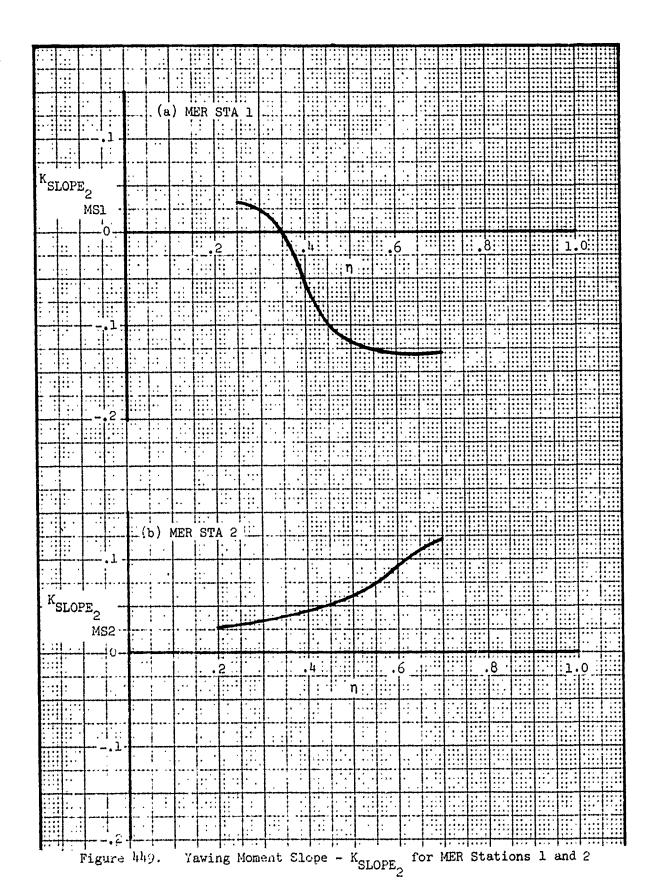
Figure 445. Yawing Moment Slope - Mach Number Break Points for MER Stations 3 and 5

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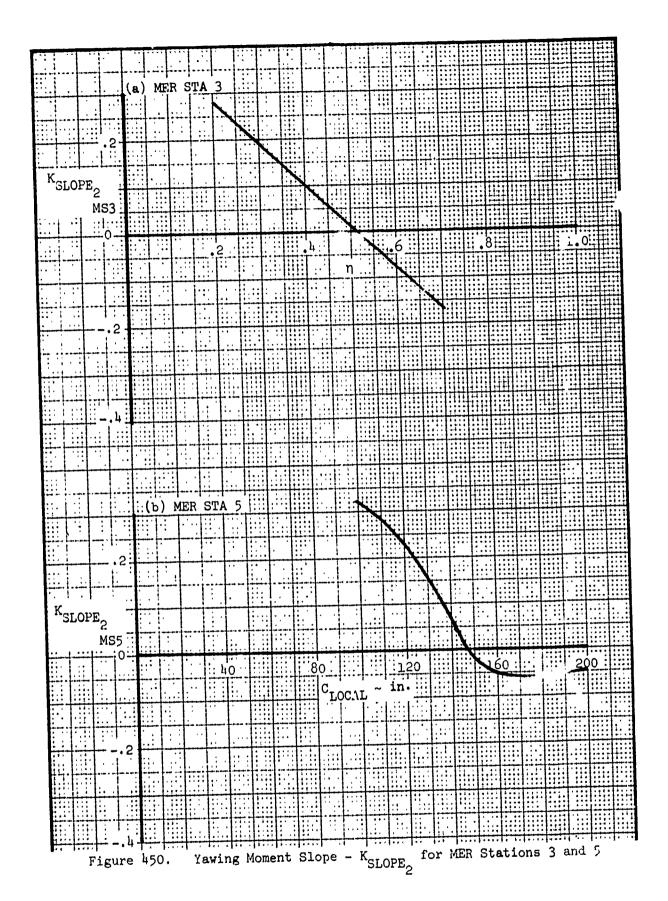


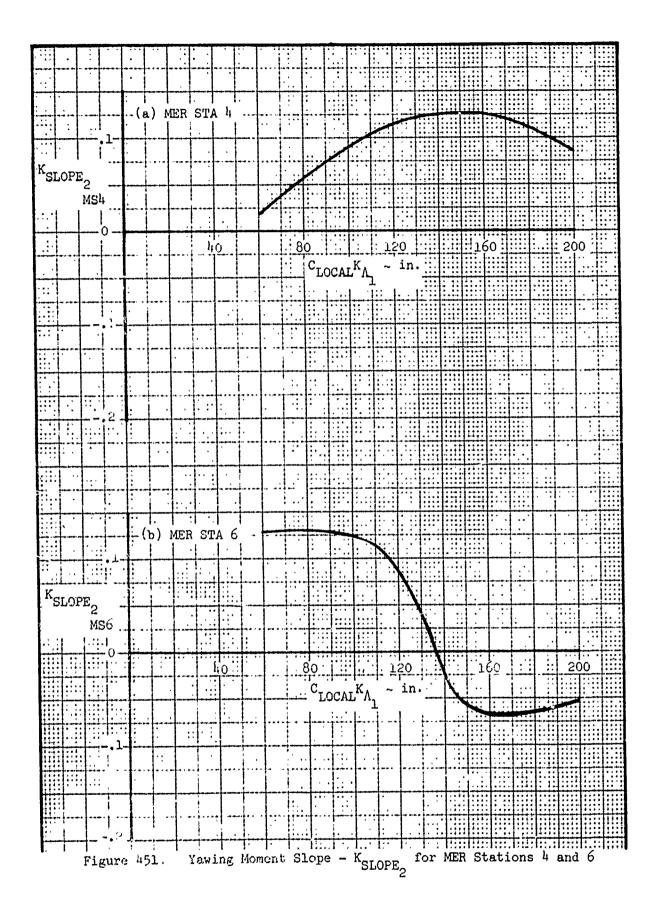


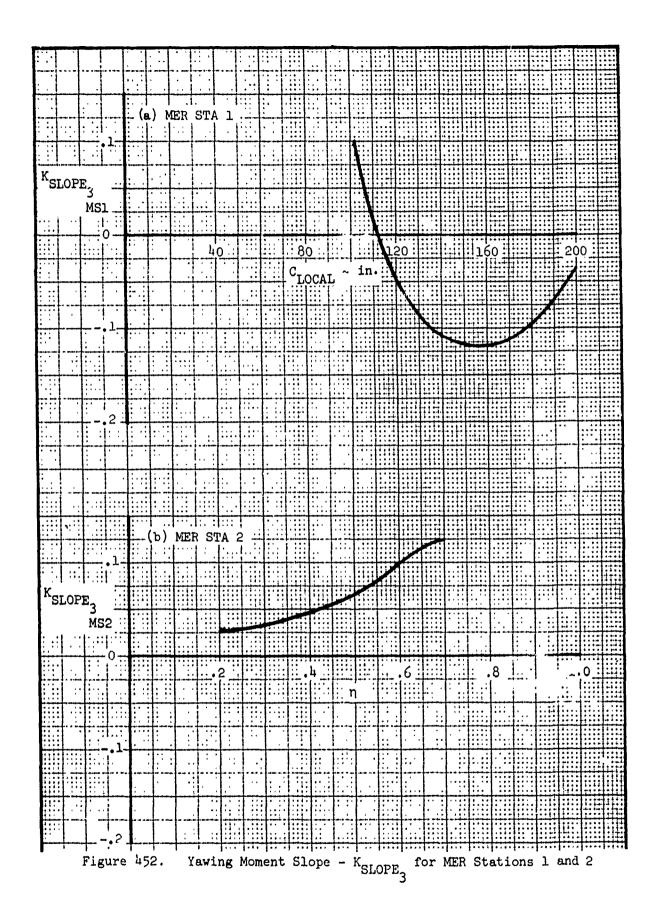


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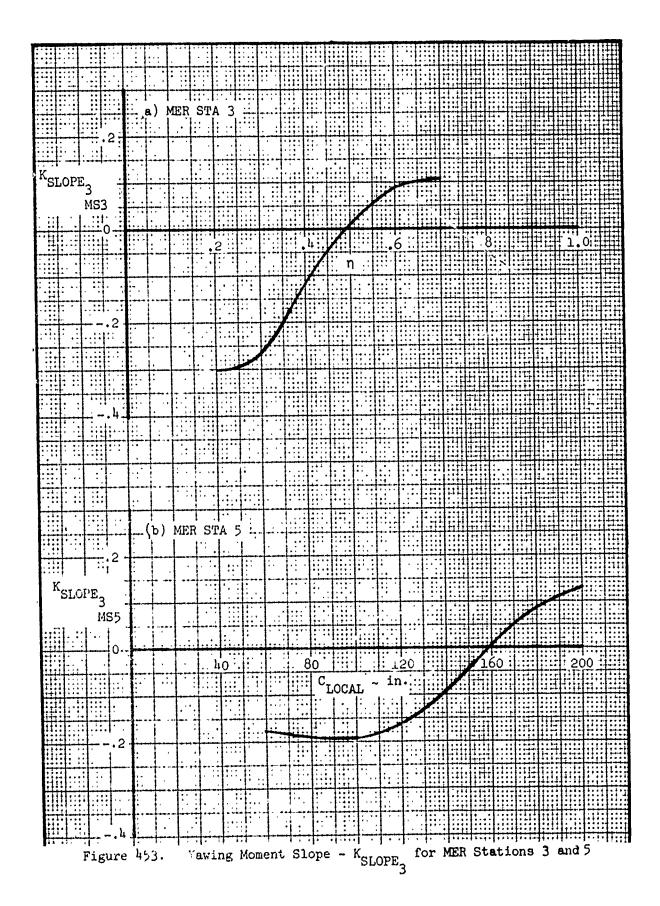




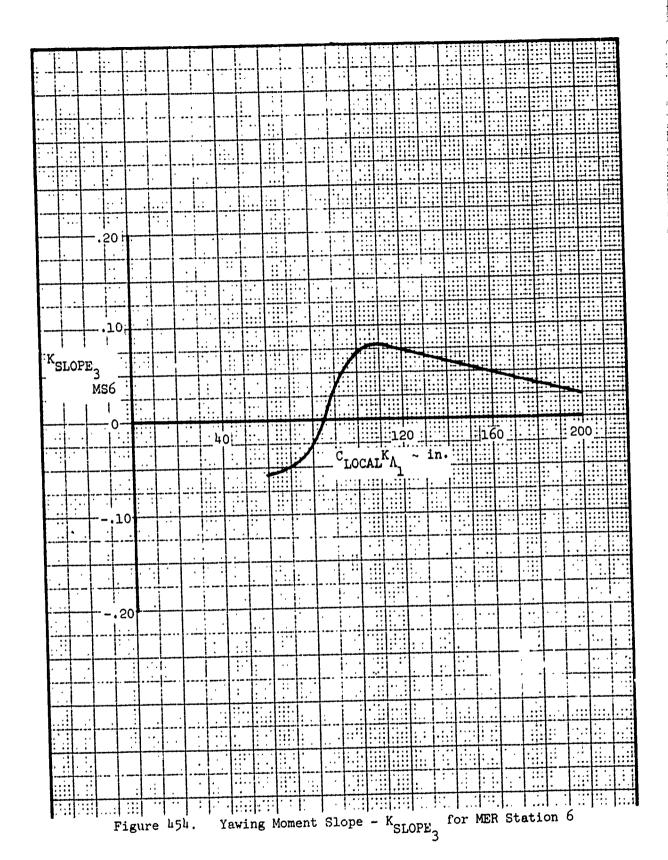


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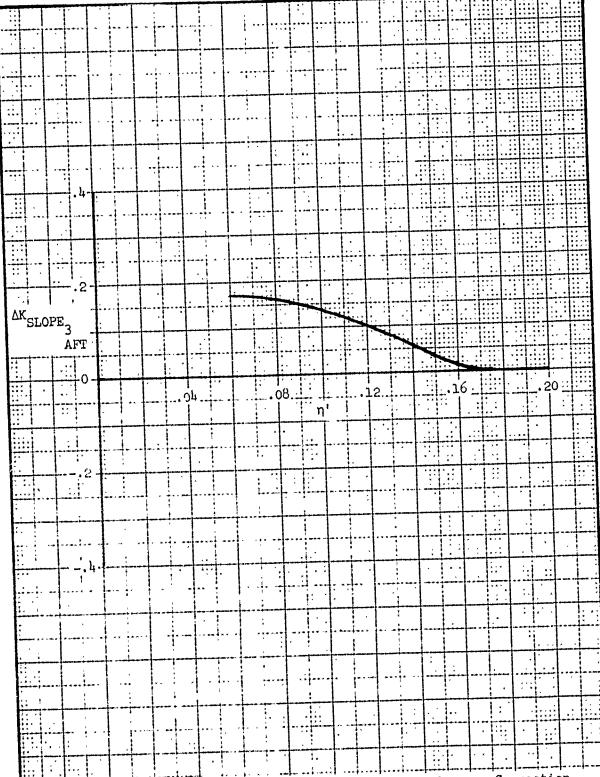


Figure 455. Yawing 'loment Slope - Fuselage Interference Correction at Mach Break 3 for the Aft Cluster

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4.2.1.3 Intercept Prediction

The value of captive store yawing moment at α =0 for a store installed on a MER at M=0.5 is defined by the following relationships. FUSELAGE CENTERLINE-MOUNTED STORES

MER Stations 1 and 2 (MS1,2):

$$\left(\frac{\text{YM}}{\text{q}}\right)_{\alpha=0} = 0$$
 By symmetry PRED MS1,2

MER Stations 3, 4, 5 and 6 (MS3-6):

where:

 $c_{\eta_{\alpha=0}}$ - Fuselage centerline captive store yawing moment coefficient at $\alpha=0$ and M=0.5.

MER STA 3 - Figure 456

MER STA 4 - Figure 456

MER STA 5 - Figure 456

MER STA 6 - Figure 456

Note separate curves for finned and unfinned stores.

 S_{REF} - Store reference area, $\frac{\pi d^2}{4}$, ft ².

 $\ell_{\rm REF}$ - Store reference length, d, ft.

WING-MOUNTED STORES

MER Stations 1, 3, 5 (MS1,3,5):

where:

 $\begin{array}{c} c_{\eta_{\alpha=0}} \\ c_L \end{array} \qquad \begin{array}{c} \text{- Defined under } \underline{\text{FUSELAGE CENTERLINE-MOUNTED STORES}} \\ \text{Note } c_{\eta_{\alpha=0}} \\ c_L \\ c_L \\ \text{MS1} \end{array}$

 $_{\alpha=0}^{\Delta C}$ - Incremental yawing moment intercept correction for wing mounted stores presented as a function of $_{\rm LOCAL}^{\bullet}$.

MER STA 1 - Figure 457 MER STA 3 - Figure 458 MER STA 5 - Figure 458

 $K_{\text{SCALE}_{\text{YM}}}$ - Yawing moment scale factor, ft. , see Section IV.

MER Stations 2, 4, 6 (MS2,4,6):

'where:

 $\begin{array}{c} C_{\eta_{\alpha=0}} \\ Q_L \end{array} \qquad \begin{array}{c} \text{- Defined under } \underline{\text{FUSELAGE CENTERLINE-MOUNTED STORES.}} \\ \text{Note } C_{\eta_{\alpha=0}} = 0 \text{, by symmetry.} \\ C_L \\ \underline{\text{MS2}} \end{array}$

- Incremental yawing moment intercept correction for wing mounted stores presented as a function of CLOCALKA MER STA 2 - Figure 457

MER STA 4 - Figure 459

MER STA 6 - Figure 459

^\Lambda_1 - Aircraft wing sweep correction factor based on the sweep angle of the quarter-chord, $\frac{\sin \Lambda}{\sin 450}$.

K_{SCALE_{YM}} - Yawing moment scale factor, ft 3, see Section IV.

Example:

Compute the yawing moment at $\alpha=0$ for an Mll7 store on MER STA 6 carried on the A-7 center pylon at M=0.5.

Required for Computation:

$$C_{LOCAL} = 127.6 \text{ in.}$$

$$K_{\Lambda_{1}} = \frac{\sin 35^{\circ}}{\sin 45^{\circ}} = .811$$

$$d = 16.13 \text{ in.}$$

$$\Delta c_{\eta_{\alpha=0}} = .48$$
 - Figure 459
MS6

$$\left(\frac{\text{YM}}{\text{q}}\right)_{\alpha=0} = \left(.18+.48\right) (1.92) (.811) = 1.03 \text{ ft}^{3}$$
PRED
MS6

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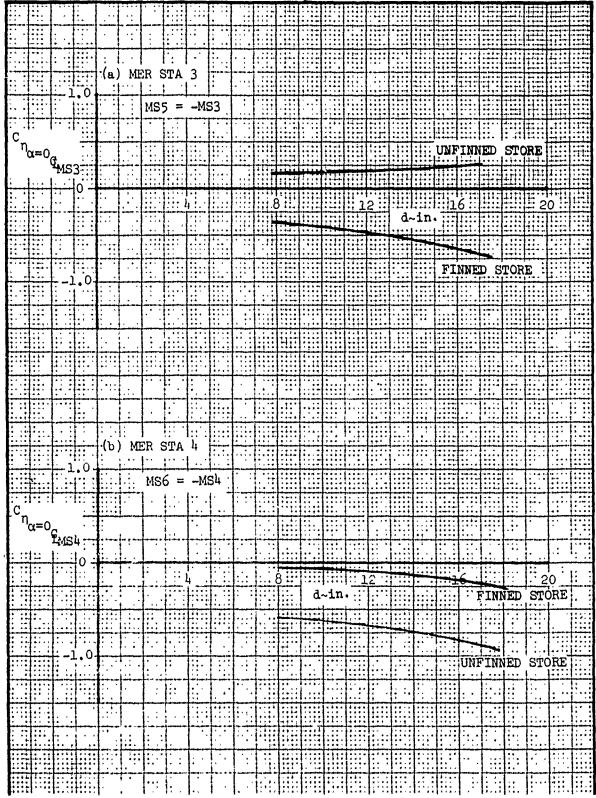


Figure 4'.6. /ewing 'loment Intercept - Stores Mounted on Fuselage Centerline, MER Stations 3-6

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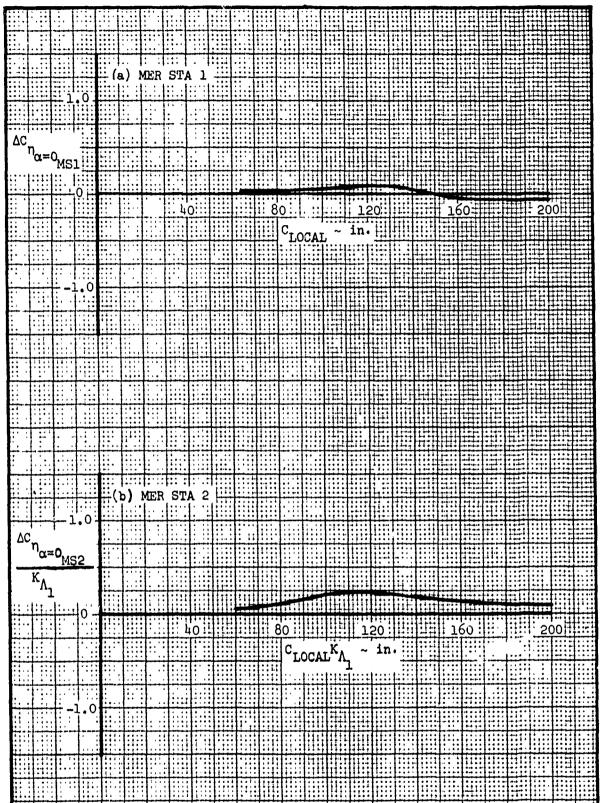


Figure 457. Yawing Moment Intercept - Incremental Coefficient for Wing-Mounted Stores, MER Stations 1 and 2

ΔC η α=0 MS3	
(a) MER STA 3	
1.0 MER STA 3	
ΔC	
-m - tr	
'α=0 _{MS3}	
80 120 160 160	200
C _{LOCAL} ~ in.	
-1.0	
(b) MER STA 5,	
AC	
ΔC η _{α=0} _{MS5}	
40: 80 11: 120 160	200
40: 80 120 160 160 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	200
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Figure 458. Yawing Moment Intercept - Incremental Coefficient for Wing-Mounted Stores, MER Stations 3 and 5

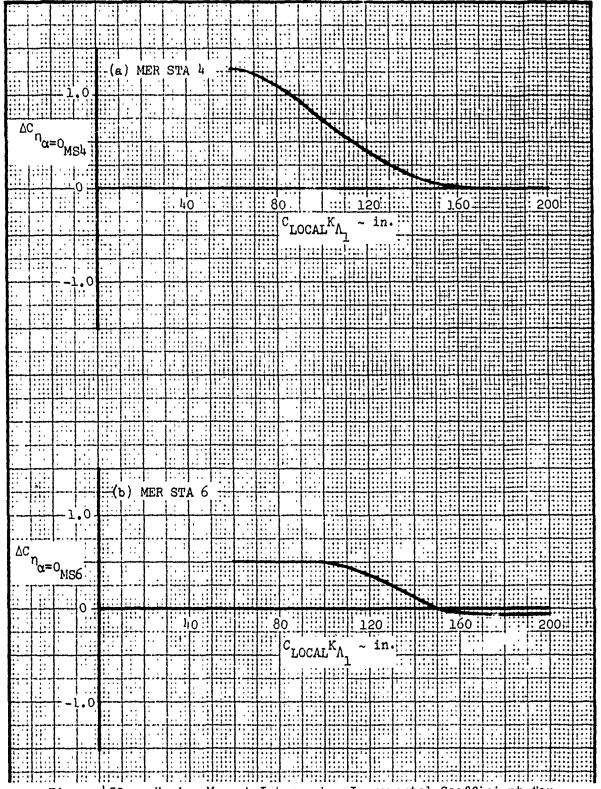


Figure 459. Yawing Moment Intercept - Incremental Coefficient for Wing-Mounted Stores, MER Stations 4 and 6

4.2.1.4 Intercept Mach Number Correction

To compute the value of captive store yawing moment at α =0 between M=0.5 and M=1.6, use the following expression.

$$\left(\frac{\underline{YM}}{\underline{q}}\right)_{\alpha=0} = \left(\frac{\underline{YM}}{\underline{q}}\right)_{\alpha=0} + \Delta \left(\frac{\underline{YM}}{\underline{q}}\right)_{\alpha=0}$$

$$M=x$$
PRED
$$M=x$$

where:

$$\left(\frac{\text{YM}}{q}\right)_{\alpha=0}$$
 - Predicted yawing moment intercept at M=0.5, Subsection PRED 4.2.1.3, ft³

$$\Delta \left(\frac{YM}{q}\right)_{\alpha=0}$$
 - Increment in yawing moment intercept at M=x, ft 3

FUSELAGE CENTERLINE MOUNTED STORES

MER Stations 1 and 2 (MS1, 2):

$$\Delta \left(\frac{YM}{q}\right)_{\alpha=0} = 0, \text{ by symmetry}$$

$$M=x$$

$$MS1,2$$

MER Stations 3, 4, 5 and 6 (MS3-6):

$$\Delta \left(\frac{\text{YM}}{\text{q}}\right)_{\alpha=0} = K_{\text{SCALE}_{\text{YM}}} \Delta C_{\eta_{\alpha=0}} = f(M)$$

$$M=X \qquad C_L$$

$$MS3-6 \qquad MS3-6$$

 $K_{\text{SCALE}_{\text{YM}}}$ - Yawing moment scale factor, ft 3 , see Section IV.

WING-MOUNTED STORES

The procedure for calculating the Mach number correction to yawing moment intercept for wing-mounted stores is essentially the same as the procedure for yawing moment slope in Subsection 4.2.1.2. The variation in Mach break points (M_0, M_1, M_2) is presented in Figures 461 through 463 as a function of C_{LOCAL} and/or K_{Λ_1} . The slopes of C_{LOCAL} versus Mach number between break points for each MER station are presented in Figures 464 through 471. The expressions below define the calculation procedures for each MER Station over the applicable Mach range.

Break 1 (M_1) : $M_0 \le x \le M_1$

MER Stations 1, 3, 4, 5 and 6 (MS1,3-6):

$$\Delta \left(\frac{\underline{YM}}{\underline{q}}\right)_{\substack{\alpha=0\\M=x\\MS1,3-6}} = \left[\left(x-M_{o}\right)K_{SLOPE_{1}}K_{SCALE_{YM}}\right]$$

where:

 $K_{\text{SLOPE}_{\underline{1}}}$ - The variation of $C_{\eta_{\alpha=0}}$ with Mach number between $M_{\underline{0}}$ and $M_{\underline{1}}$.

MER STA 1 - Figure 464

MER STA 3 - Figure 465

MER STA 4 - Figure 466

MER STA 5 - Figure 465

MER STA 6 - Figure 466

 $K_{\text{SCALE}_{\text{YM}}}$ - Yawing moment scale factor, ft³, see Section IV.

MER Station 2 (MS2):

$$\Delta \left(\frac{YM}{q}\right) \underset{M=x}{\underset{M=x}{\text{mex}}} = \left[\left(x-M_{o}\right)\left(\begin{array}{c}K_{\text{SLOPE}_{1}} + \Delta K_{\text{SLOPE}_{1}}\\MS2\end{array}\right) \right] K_{\text{SCALE}_{YM}}$$

where:

 K_{SLOPE_1} - The variation of $C_{\eta_{\alpha=0}}$ with Mach number between M_0 and M_1 .

MER STA 2 - Figure 464

 $\Delta K_{\text{SLOPE}_1}$ - Incremental slope due to fuselage interference. MER STA 2 - Figure 467

- Yawing moment scale factor, ft3, see Section IV. K SCALE_{VM}

Break 2 (M_2) : $M_1 \le x \le M_2$

MER Station 1, 2, 3, 5 and 6 (MS1-3,5,6):

$$\Delta\left(\frac{\text{YM}}{\text{q}}\right)_{\alpha=0} = \begin{bmatrix} \left(\text{M}_{1}^{-\text{M}}_{\circ}\right) \left(\text{K}_{\text{SLOPE}_{1}} + \Delta \text{K}_{\text{SLOPE}_{1}}\right) \\ \text{MS1-3,5,6} \\ + \left(\text{x-M}_{1}\right) \text{K}_{\text{SLOPE}_{2}} \\ \text{MS1-3,5,6} \end{bmatrix}^{\text{K}_{\text{SCALE}_{\text{YM}}}}$$

where:

KSLOPE, - Defined under Break 1.

ΔK_{SLOPE} - Defined under Break 1.

- The variation in $C_{\eta_{\alpha=0}}$ with Mach number between Ksrope² M_1 and M_2 .

MER STA 1 - Figure 463

MER STA 2 - Figure 468

MER STA 3 - Figure 469

MER STA 5 - Figure 469

MER STA 6 - Figure 470

- Yawing moment scale factor, ft3, see Section IV. ${}^{K}_{\mathtt{SCALE}_{\underline{YM}}}$

MER Station 4 (MS4):

$$\Delta \left(\frac{\text{YM}}{\text{q}}\right)_{\alpha=0} = \begin{bmatrix} \left(\text{M}_1 - \text{M}_0\right) & \text{K}_{\text{SLOPE}_1} & + \left(\text{x-M}_1\right) & \left(\text{K}_{\text{SLOPE}_2} & + \Delta \text{K}_{\text{SLOPE}_2}\right) \\ \text{MS4} & \text{MS4} & \text{MS4} \end{bmatrix}.$$

$$\begin{pmatrix} \text{K}_{\text{SCALE}_{\text{YM}}} & \text{$$

where:

KSLOPE, - Defined under Break 1.

AND A STORY THE COLUMN TO SEE WHEN THE WAY TO SEE AND THE WAY TO SEE A

 $^{K}_{SLOPE_{2}}$ - The variation in $^{C}_{\eta_{\alpha=0}}$ with Mach number between $^{M_{1}}$ and $^{M}_{2}.$

MER STA 4 - Figure 470

 $\Delta K_{\mathrm{SLOPE}_2}$ - Incremental slope due to pylon height. MER STA 4 - Figure 471

 $K_{\text{SCALE}_{\text{YM}}}$ - Yawing moment scale factor, ft³, see Section IV.

A similar computational procedure is included in Subsection 4.2.1.2.

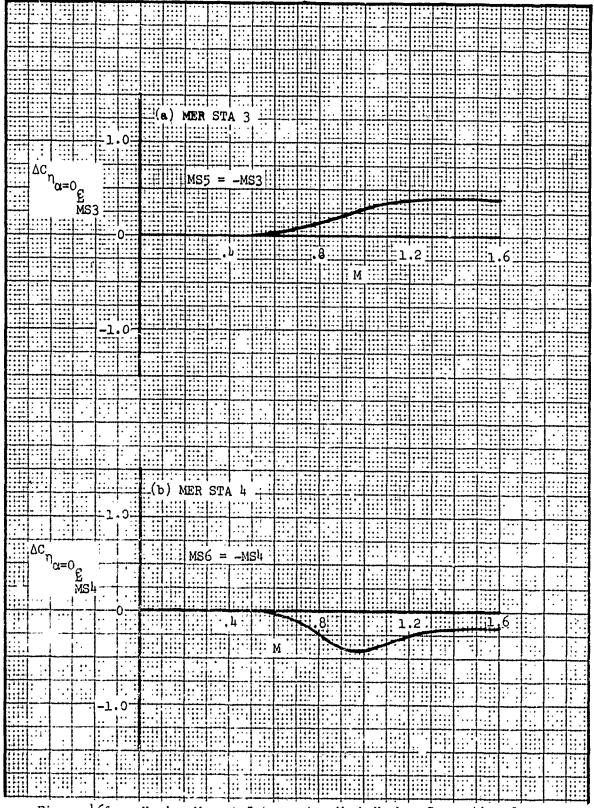
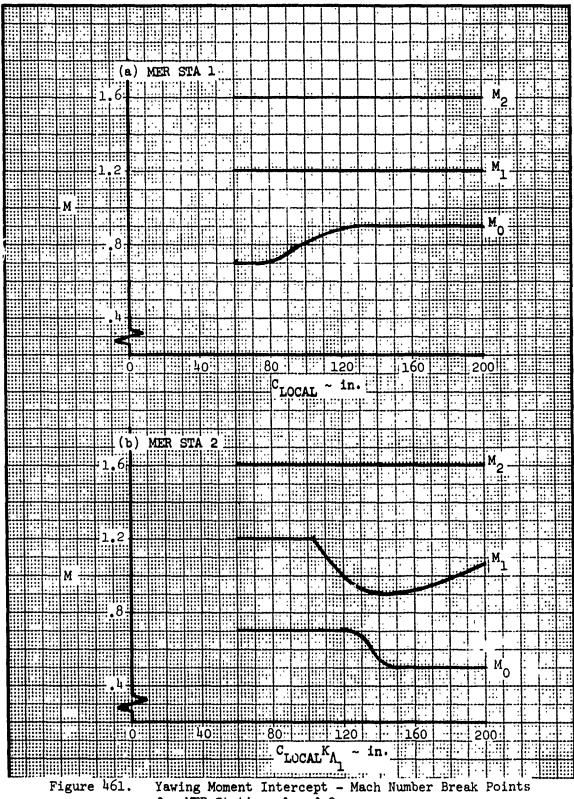


Figure 460. Yawing Moment Intercept - Mach Number Correction for Stores Mounted on Fuselage Centerline, MER Stations 3-6



for MER Stations 1 and 2

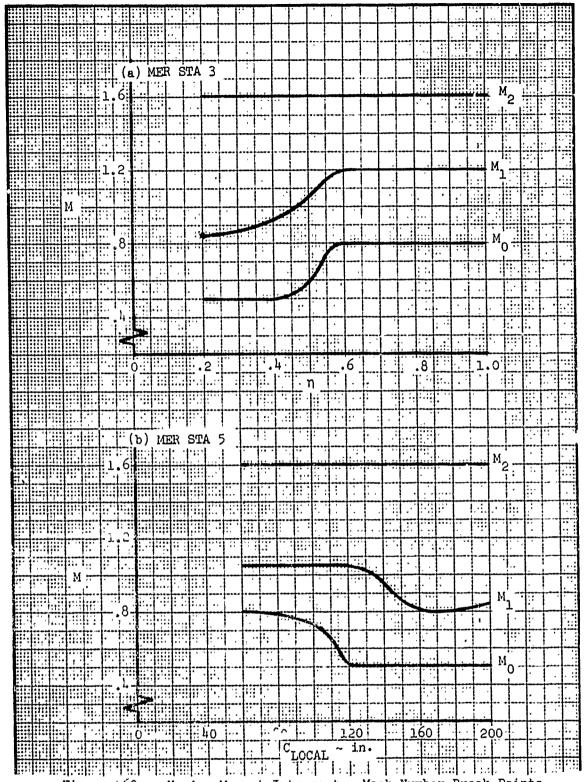
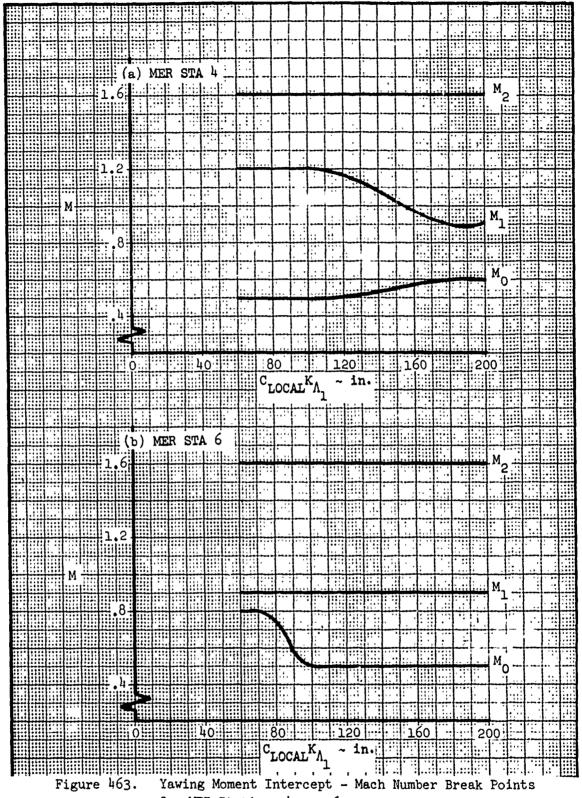


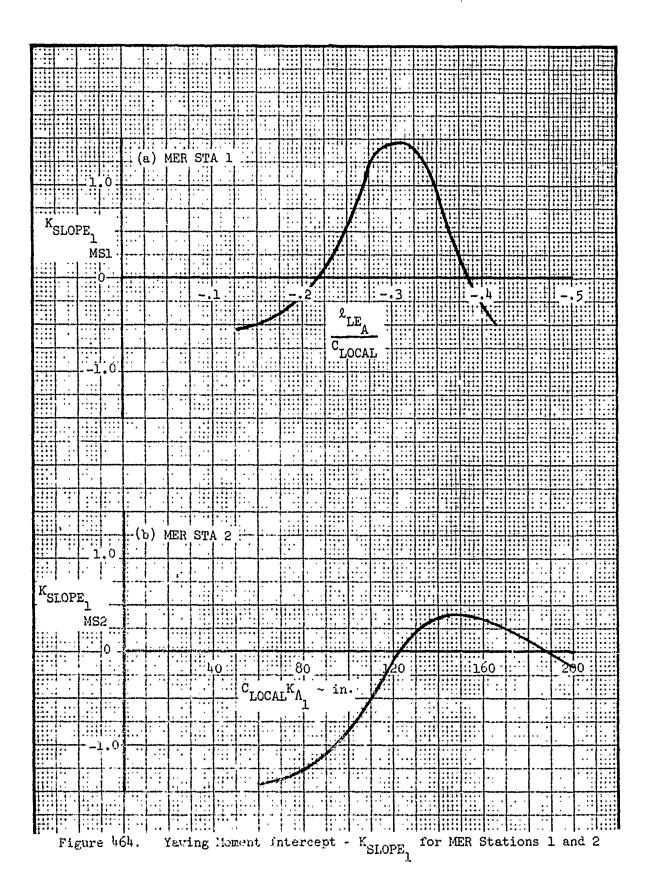
Figure 462. Yawing Moment Intercept - Mach Number Break Points for MER Scations 3 and 5

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for MER Stations 4 and 6

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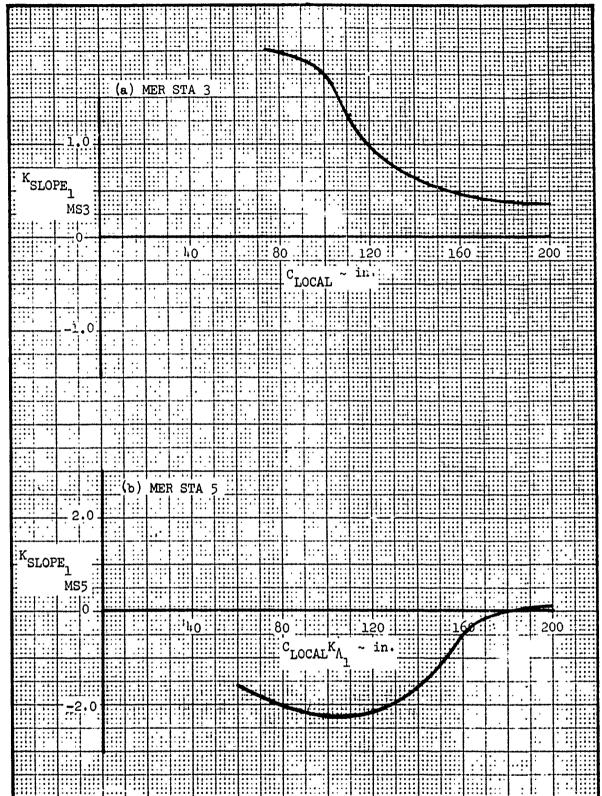
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Figure 465. Yawing Moment Intercept - K_{SLOPE} for MER Stations 3 and 5

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Fig. 1 200. Youing Mount Intercept - KSLOPE, for MER Stations 4 and 6

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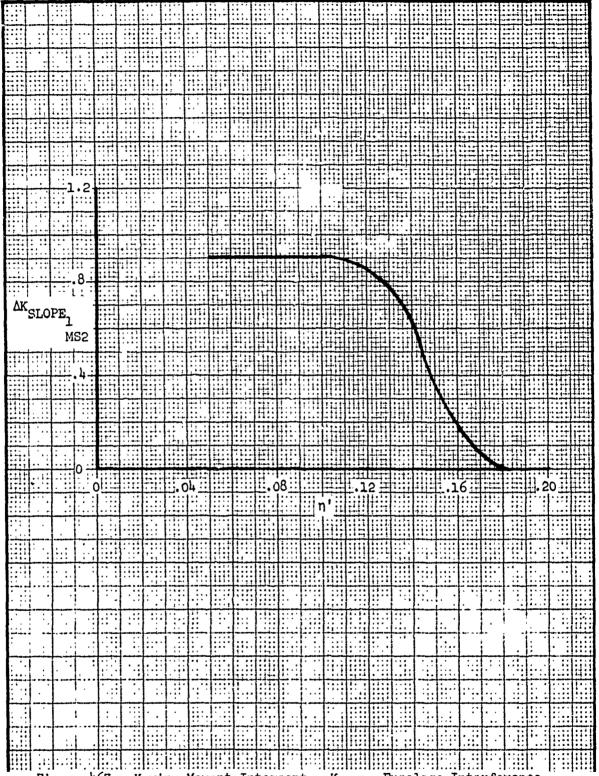
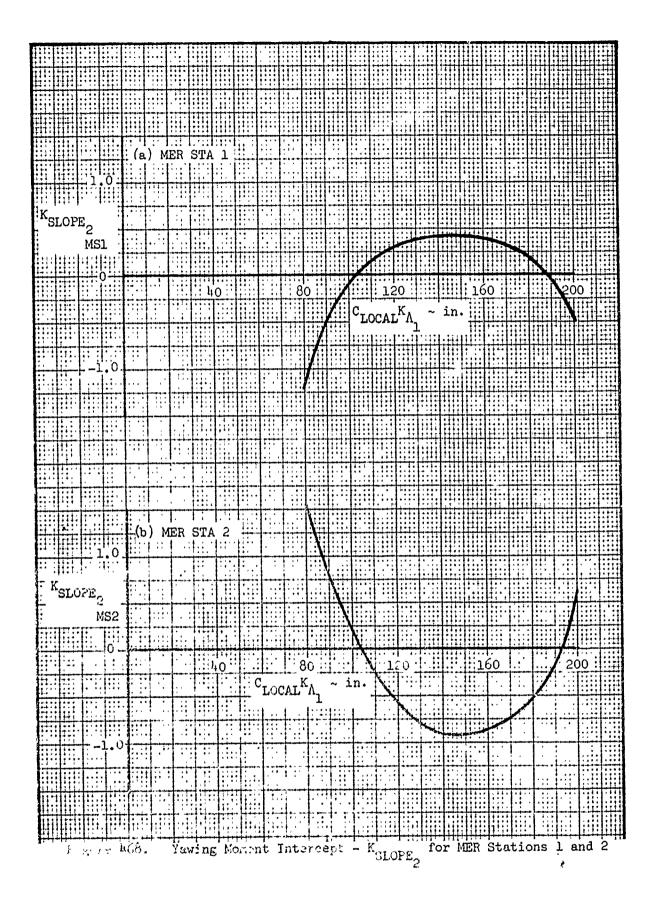


Figure 467. Yawing Moment Intercept - K_{SLOPE} Fuselage Interference Correction for MER Station 2



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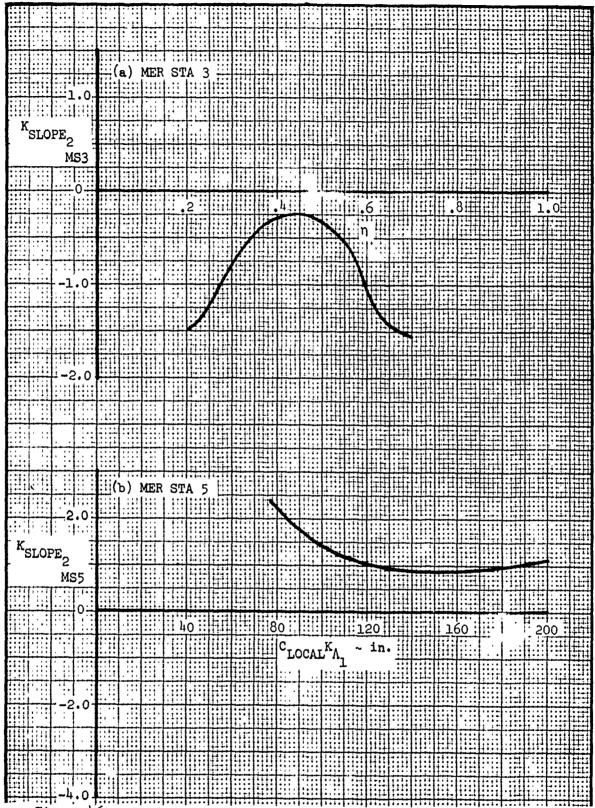
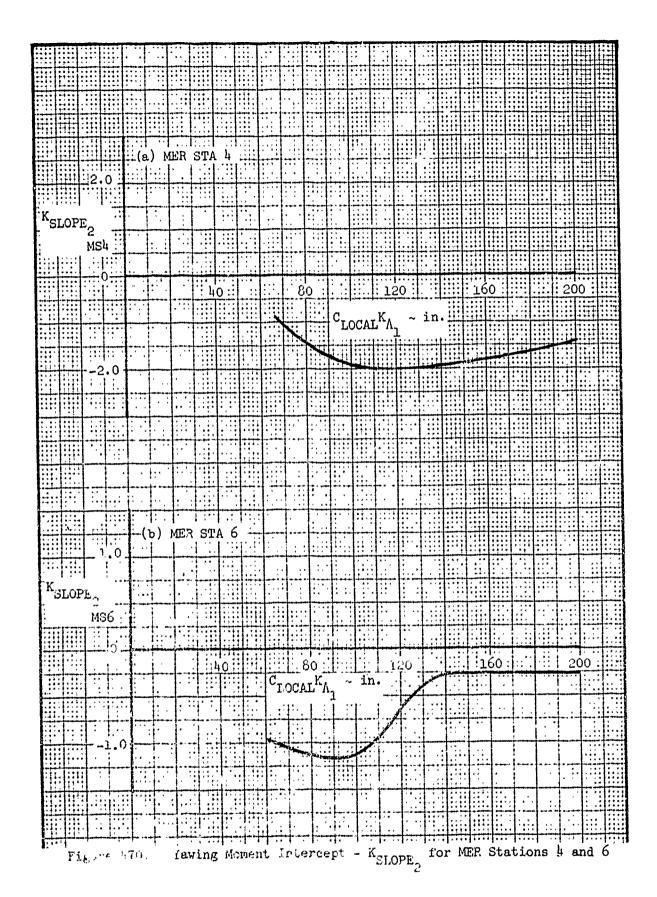


Figure 469. Yawing Moment Intercept - K_{SLOPE} for MER Stations 3 and 5



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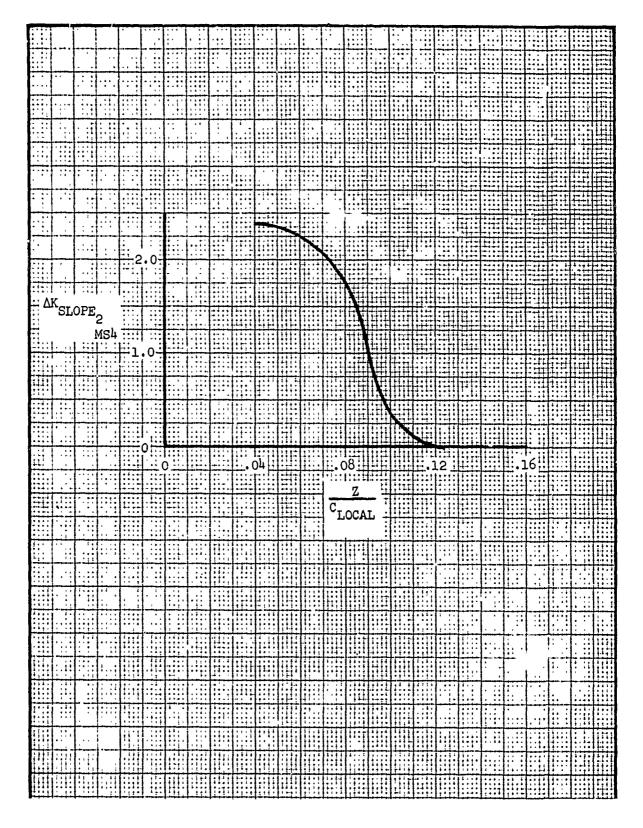


Figure 471. Yawing Moment Intercept - K_{SLOPE2} Pylon Height Correction for MER Station 4

4.2.2 Increment Ajrcraft Yaw

The captive store incremental yawing moment due to aircraft yaw is obtained as the difference between the yaw2d pitch polar and the zero-yaw pitch polar data as outlined in Section III. The incremental yawing moment slope, $\Delta\left(\frac{YM}{q}\right)_{\alpha}$, and intercept, $\Delta\left(\frac{YM}{q}\right)_{\alpha=0}$, thus obtained are linear with aircraft yaw angle; therefore, the incremental slope and intercept equations are derived and presented per degree of store yaw angle, β . The incremental airloads due to aircraft yaw are referenced to the coordinate system presented in Subsection 2.3.1.2.

To compute the incremental yawing moment slope, $\Delta \Big(\frac{YM}{q}\Big)_{\alpha}$, the following equation is used.

$$\Delta \left(\frac{YM}{q}\right)_{\alpha} = \Delta \left(\frac{YM}{q}\right)_{\alpha_{\beta}} \cdot \beta$$

where:

- $\Delta \left(\frac{\gamma_M}{a}\right)_{\alpha_\beta} \text{Incremental yawing moment slope per degree } \beta$ as obtained by the methods presented in the following sections, $\frac{ft^3}{\text{deg}^2}$
- β Store yaw angle, deg., equal to ${}^+\Psi_{A/C}$ for right wing store installations or ${}^-\Psi_{A/C}$ for left wing store installations.

The equation and procedure for computing the incremental yawing moment intercept, $\Delta\left(\frac{YM}{q}\right)_{\alpha=0}$, due to aircraft yaw is similar to the above presentation for incremental yawing moment slope.

4.2.2.1 Slope Prediction

The incremental yawing slope prediction is divided into two sections, fuselage centerline-mounted stores and wing-mounted s^{α} . The technique presented in this section covers the Mach α_{**} or range 0.5 to 1.6.

FUSELAGE CENTERLINE-MOUNTED STORES

MER STATIONS 1 - 6 (MS1-6):

$$\Delta \left(\frac{\underline{YM}}{\underline{q}}\right)_{\alpha_{\beta_{\underline{c}}}} = \Delta c_{\eta_{\alpha_{\beta_{\underline{c}}}}} \kappa_{SCALE_{\underline{YM}}}$$

$$\kappa_{SCALE_{\underline{YM}}}$$

$$\kappa_{SCALE_{\underline{YM}}}$$

where:

- Variation of C_n presented as a function of Mach number, $\frac{1}{\deg^2}$.

MER STA 1 - Figure 472

MER STA 2 - Figure 473

MER STA 3 - Figure 472

MER STA 4 - Figure 473

MER STA 5 - Figure 472

 $K_{\text{SCALE}_{\text{YM}}}$ - Defined in Section IV, ft³.

MER STA 6 - Figure 473

WING-MOUNTED STORES

MER STATIONS 1, 3, and 5 (MS1,3,5):

$$\Delta \left(\frac{\text{YM}}{\text{q}}\right)_{\alpha_{\beta}} = \left(\Delta C_{\eta_{\alpha_{\beta}}} + K_{\ell_{\text{LE}_{A}}} \Delta C_{\eta_{\alpha_{\beta}}}\right) K_{\text{SCALE}_{\text{rid}}} \Lambda_{1}$$

$$MS1,3,5 \qquad MS1,3,5 \qquad \frac{\ell_{\text{LE}_{A}}}{C}$$

where:

- Incremental C per degree β presented as a function of wing spanwise position for Mach numbers 0.7, 0.9, 1.05, 1.2, and 1.6, $\frac{1}{\deg^2}, \text{ Table 11.}$

 $\frac{\kappa_{\ell_{\text{LE}_{\underline{A}}}}}{c}$

- Proportioning factor based on the distance from the wing leading edge to the nose of the store on MER STATION 1 measured in the wing plan view divided by the local wing chord, positive, Figure 485.

 $\frac{\Delta c_{\eta_{\sigma_{\beta_{LE_{A}}}}}}{\frac{\ell_{LE_{A}}}{C}}$

- Incremental $C_{\eta_{\alpha}}$ per degree β based on $L_{LE_{A}}/C$ defined above and presented as a function of Mach number, $\frac{1}{\deg^2}$.

MER STA 1 - Figure 484

MER STA 3 - Figure 484

MER STA 5 - Figure 484

 $\kappa_{\text{SCALE}_{\text{YM}}}$

- Defined in Section IV, ft^3 .

 κ_{Λ_1}

- Wing sweep correction factor, $\frac{\sin \Lambda}{\sin \frac{1}{150}}$, where Λ is the quarter chord sweep of the aircraft wing.

MER STATIONS 2,4, and 6 (MS2,4,6):

$$\Delta \left(\frac{\text{YM}}{\text{q}}\right)_{\alpha_{\beta}} = \Delta c_{\eta_{\alpha_{\beta}}} K_{\text{SCALE}_{\text{YM}}} K_{\Lambda_{1}}$$

$$MS2, 4, 6 MS2, 4, 6$$

where:

- Incremental $C_{\eta_{\alpha}}$ per degree β presented as a function of wing spanwise position for Mach numbers 0.7, 0.9, 1.05, 1.2 and 1.6, $\frac{1}{\deg^2}$, lable 11.

K_{SCALF_{YM}} - Defined in Section IV, ft³.

 $K_{\Lambda_{\gamma}}$ - Defined in MS1,3,5 above.

The variation of $\Delta C_{\eta_{\alpha_{\beta}}}$ for MER STATIONS 1-6 is presented

at distinct Mach numbers of 0.7, 0.9, 1.05, 1.2, and 1.6. Table 11 presented below is a guide for locating the curves for $\Delta C_{\eta_{\alpha}}$

for each MER station at the Mach numbers indicated above. For Mach numbers between 0.5 and 0.7, the value at M=0.7 should be used in the computation. For Mach numbers between 0.7 and 1.6 other than those distinctly presented, linear interpolation should be used between the appropriate Mach numbers to obtain the required value for computation.

TABLE 11. INCREMENTAL YAWING MOMENT SLOPE COEFFICIENT DUE TO YAW - FIGURE LOCATION GUIDE

		MACH NUMBER											
ΔC _{ηαβ}		0.7	0.9	1.05	1.2	1.6							
,		Figure Numbers											
MER STA	1	474	476	478	480	482							
MER STA	2	475	477	479	481	483							
MER STA	3	474	476	478	480	482							
MER STA	4	4 7 5	477	479	481	483							
MER STA	5	474	476	478	48c	482							
MER STA	6	475	477 .	479	481	1183							

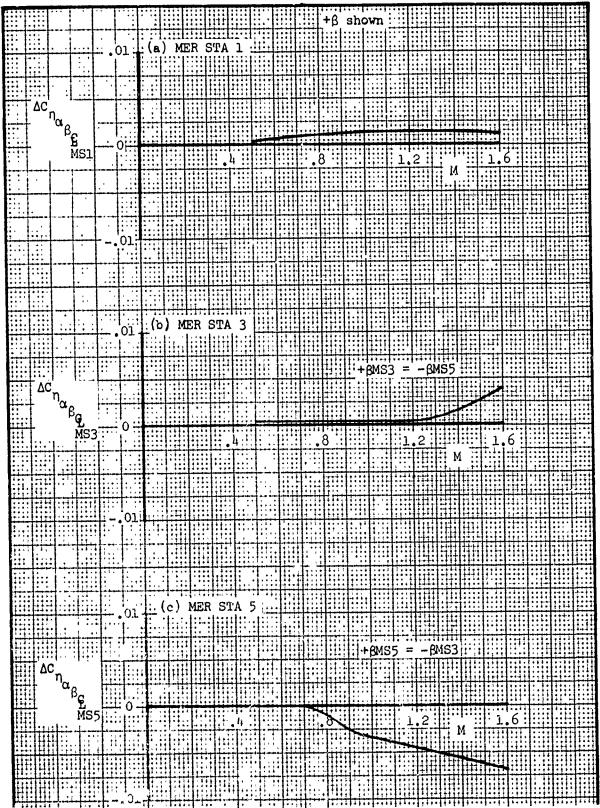


Figure 172. Incremental Yawing Moment Slope Due to Yaw - Coefficient for Scores Mounted on Fuselage Centerline, MER Stations 1,3 and 5

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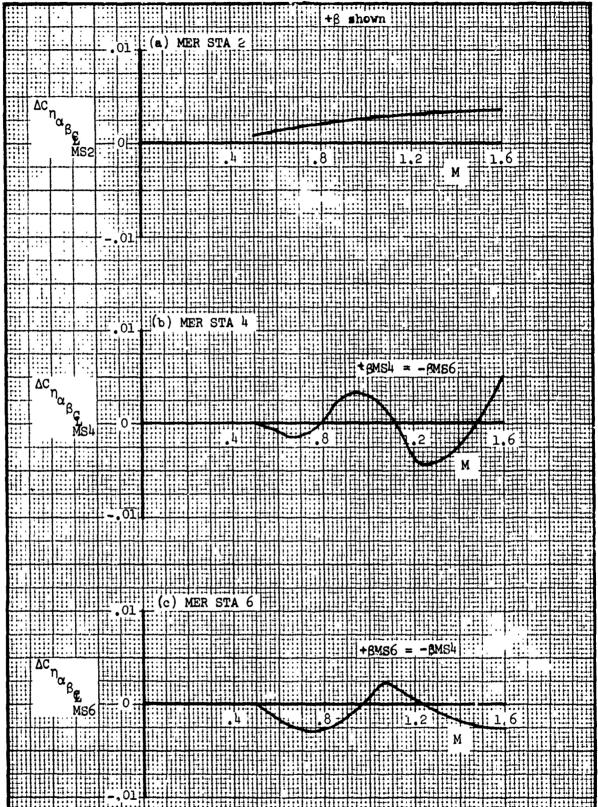


Figure 473. Incremental Yawing Moment Slope Due to Yaw - Coefficient for Stores Mounted on Fuselage Centerline, MER Stations 2, 4 and 6

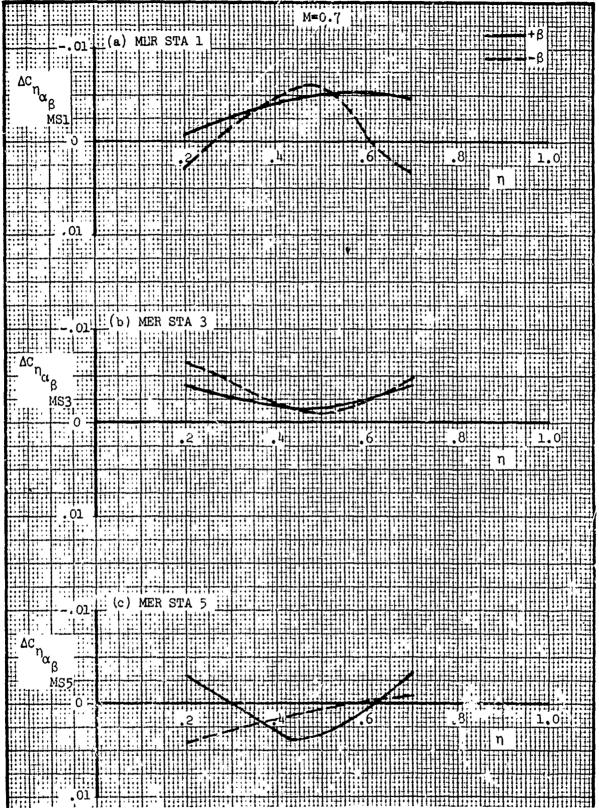
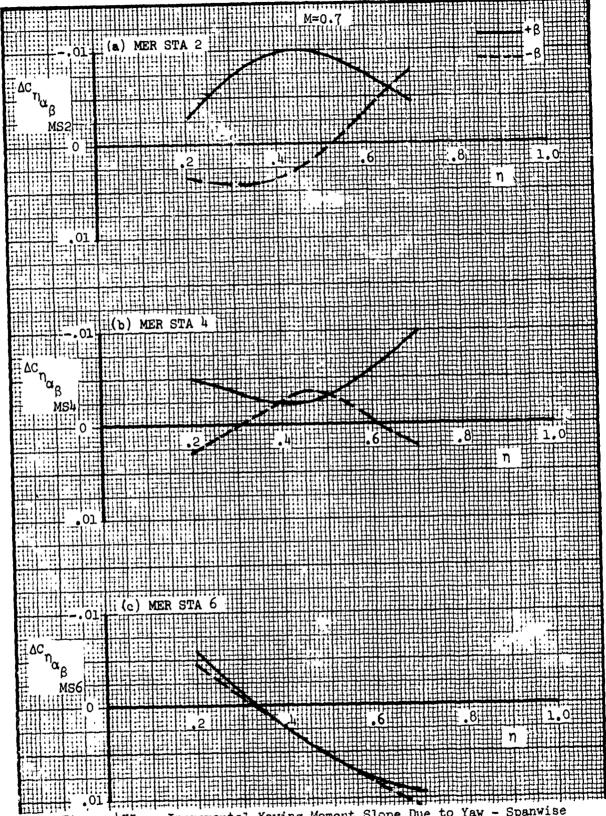


Figure 474. Incremental Yawing Momert Slope Due to Yaw - Spanwise Correction at M = 0.7 for MER Stations 1, 3 and 5



igure 475. Incremental Yawing Moment Slope Due to Yaw - Spanwise Correction at M = 0.7 for MER Stations 2, 4, and 6

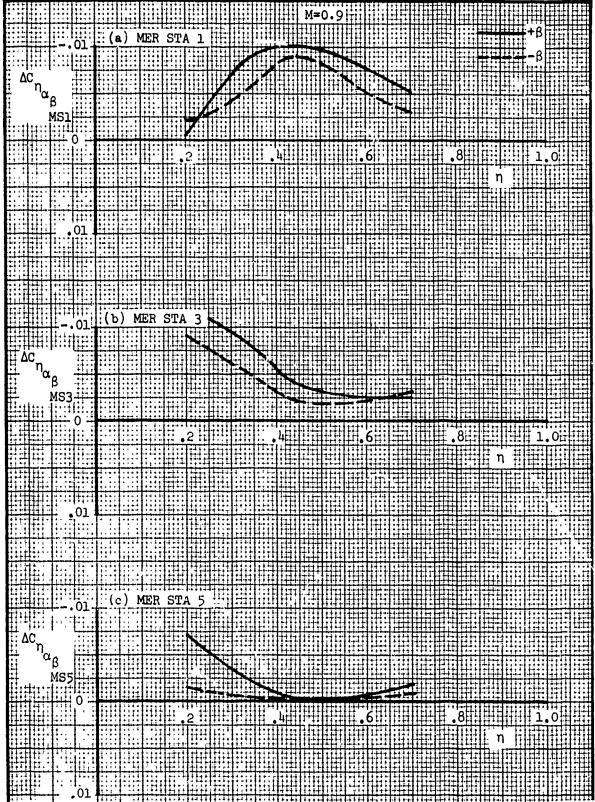
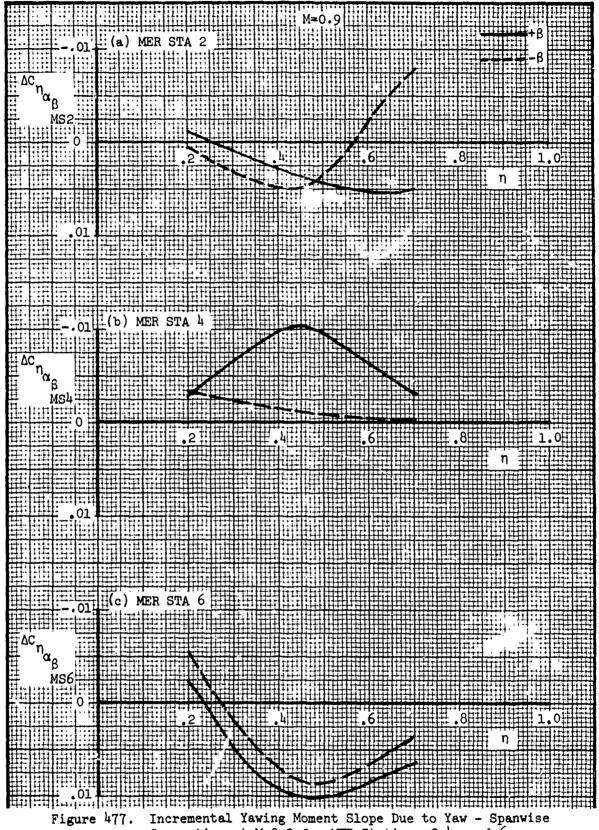
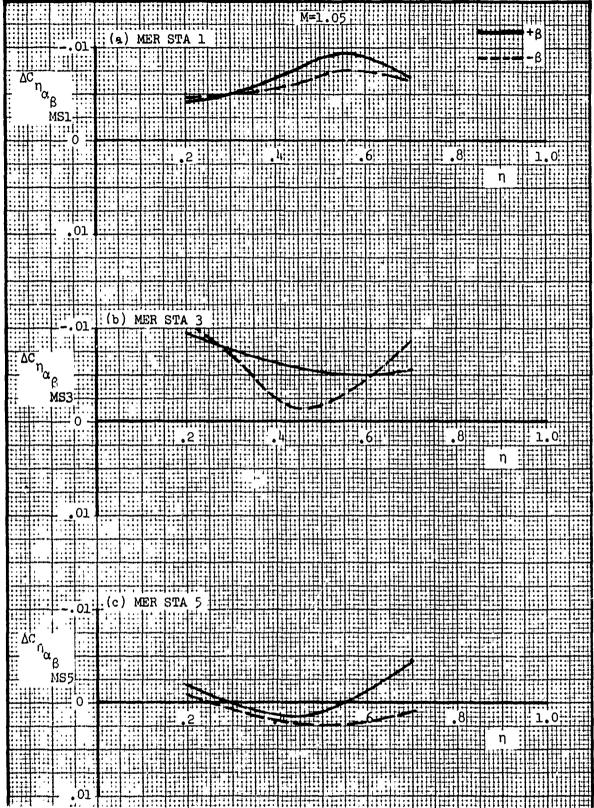


Figure 476. Incremental Yawing Moment Slope Due to Yaw - Spanwise Correction at M = 0.9 for MER Stations 1, 3, and 5

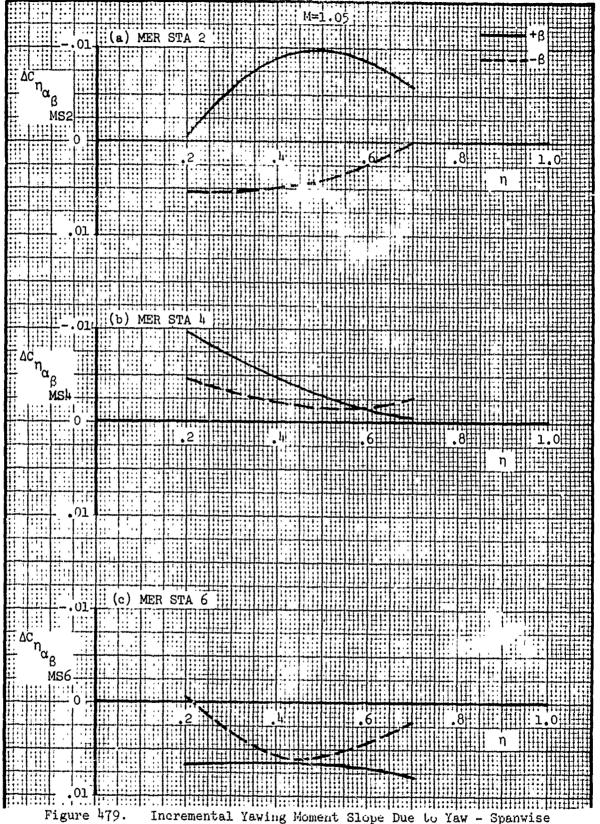


Correction at M=0.9 for MER Stations 2,4, and 6

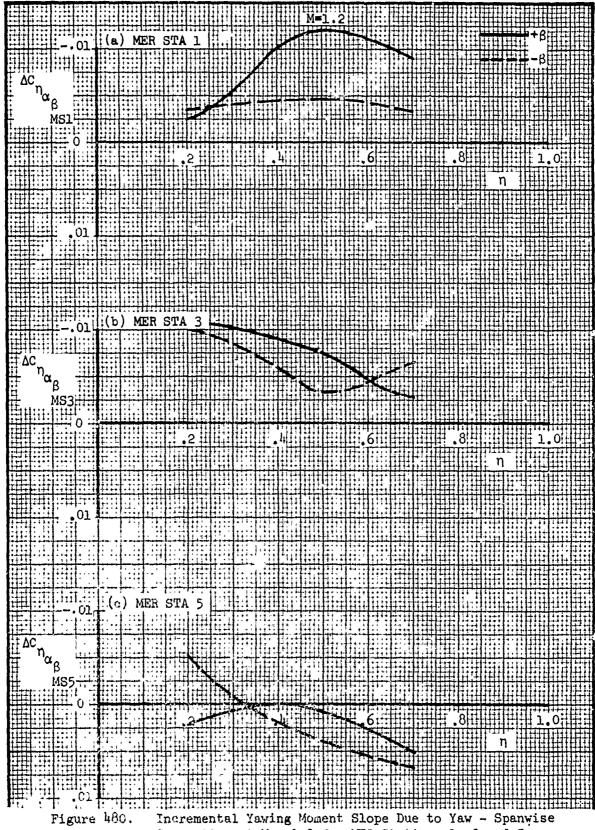


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Figure 170. Incremental Yawing Moment Slope Due to Yaw - Spanwise Correction at M = 1.05 for MER Stations 1,3 and 5



Incremental Yawing Moment Slope Due to Yaw - Spanwise Correction at M = 1.05 for MER Stations 2, 4 and 6



Incremental Yawing Moment Slope Due to Yaw - Spanwise Correction at M = 1.2 for MER Stations 1, 3 and 5

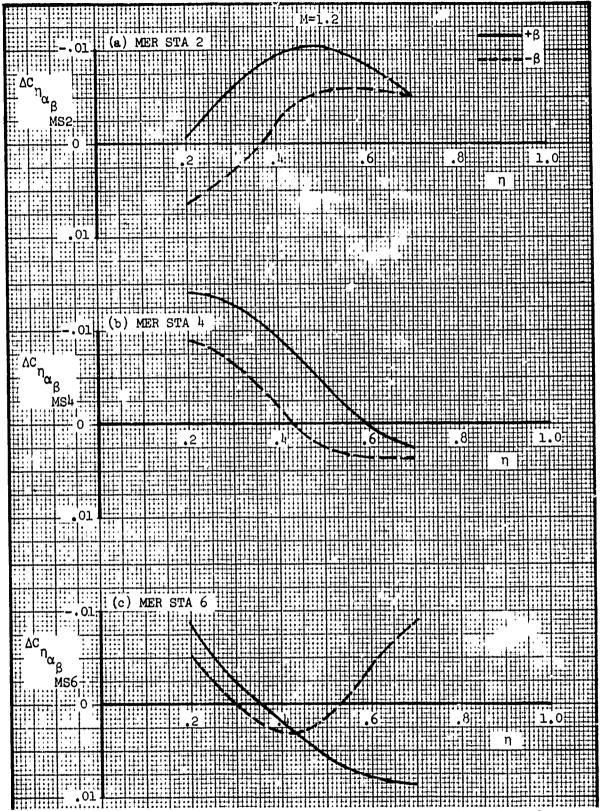


Figure 481. Incremental Yawing Moment Slope Due to Yaw - Spanwise Correction at M = 1.2 for MER Stations 2, 4 and 6

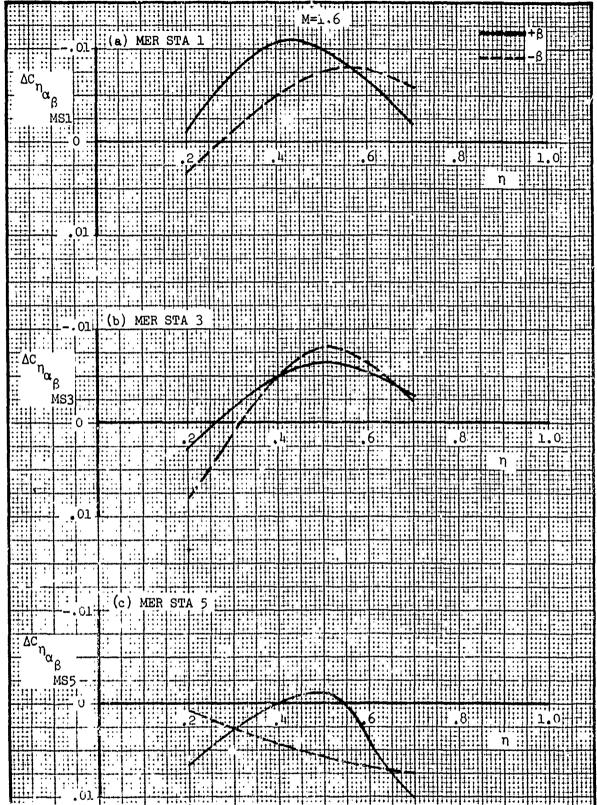


Figure 482. Incremental Yawing Moment Slope Due to Yaw - Spanwise Correction at M = 1.6 for MER Stations 1, 3 and 5

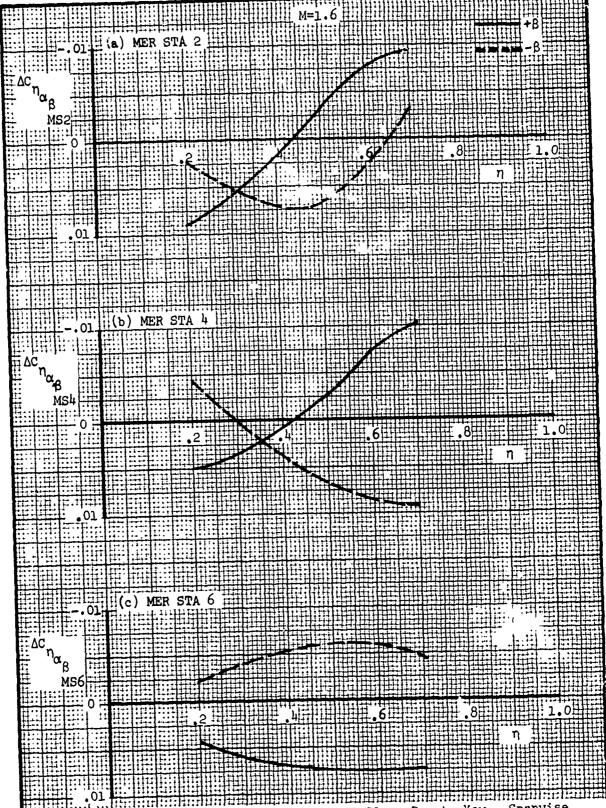


Figure 483. Incremental Yawing Moment Slope Due to Yaw - Spanwise Correction at M = 1.6 for MER Stations 2,4, and 6

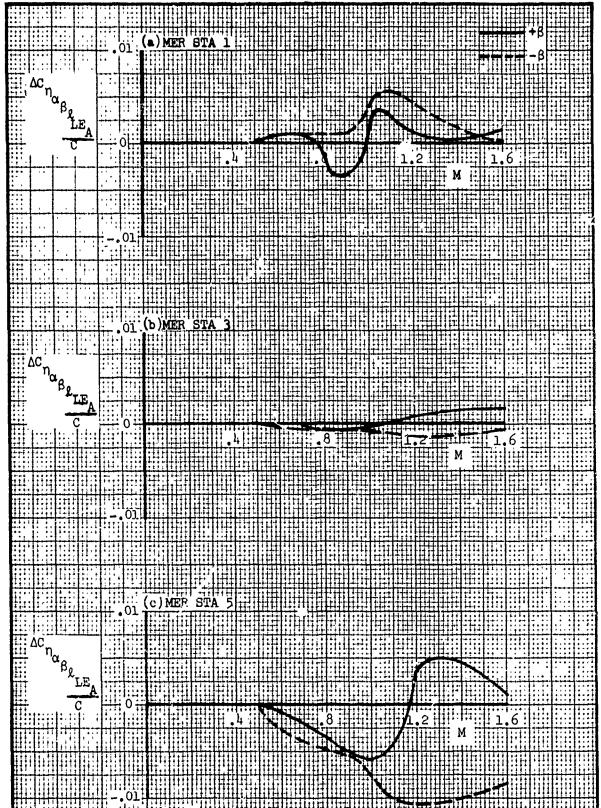


Figure 484. Incremental Yawing Moment Slope Due to Yaw - Chordwise Correction for MER Stations 1, 3 and 5

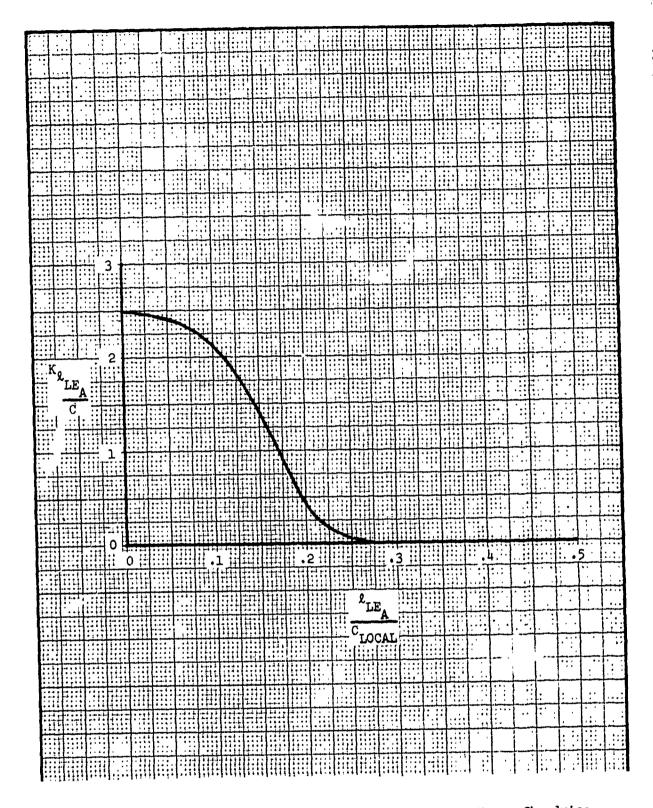


Figure 485. Incremental Yawing Moment Slope Due to Yaw - Chordwise Correction Factor

4.2.2.2 <u>Intercept Prediction</u>

The incremental yawing moment intercept prediction is divided into two sections, fuselage centerline-mounted stores and wing-mounted stores. The technique presented in this section covers the Mach number range 0.5 to 1.6.

FUSELAGE CENTERLINE-MOUNTED STORES

MER STATIONS 1-6 (MS1-6):

$$\Delta \left(\frac{\underline{YM}}{\underline{q}}\right)_{\alpha=0}_{\beta_{\underbrace{E}}} = \Delta C_{\eta_{\alpha=0}}_{\alpha=0}_{\beta_{\underbrace{E}}} K_{SCALE_{\underline{YM}}}$$

where:

$$\Delta C_{\eta_{\alpha=0}}$$
 - Variation of $C_{\eta_{\alpha=0}}$ presented as a function of Mach number, $\frac{1}{\text{deg.}}$.

MER STA 1 - Figure 486

MER STA 2 - Figure 487

MER STA 3 - Figure 486

MER STA 4 - Figure 487

MER STA 5 - Figure 486

MER STA 6 - Figure 487

 $K_{\text{SCALE}_{\text{YM}}}$ - Defined in Section IV, ft³.

WING-MOUNTED STORES

MER STATIONS 1, 3, and 5 (MS1,3,5):

$$\Delta \left(\frac{YM}{q}\right)_{\alpha=0} = (\Delta C_{\eta_{\alpha=0}} + K_{\ell_{LE}} \Delta C_{\eta_{\alpha=0}}) K_{SCALE_{YM}} K_{\ell_{LE}}$$

$$MS1,3,5 \qquad MS1,3,5 \qquad \Delta C_{\eta_{\alpha=0}} K_{\ell_{LE}} K_{\ell_{LE}}$$

where:

 $\Delta C_{\eta_{\alpha=0}}$ - Increment as a final Markov Mark

- Incremental C per degree β presented as a function of wing spanwise position for Mach numbers 0.7, 0.9, 1.05, 1.2, and 1.6, $\frac{1}{\deg}$, Table 12.

 $\frac{\kappa_{\ell_{LE_{\underline{A}}}}}{c}$

- Proportioning factor based on the distance from the wing leading edge to the nose of the store on MER STATION 1 measured in the wing plan view divided by the local wing chord, positive, Figure 485, Subsection 4.2.2.1.

 $\frac{\Delta c_{\eta_{\alpha=0}}}{\frac{\ell_{LE_{A}}}{c}}$

- Incremental $C_{\eta_{Cl}=0}$ per degree β based on ℓ_{LE} /C defined above and presented as a function of Mach number, $\frac{1}{\deg}$

MER STA 1 - Figure 498

MER STA 3 - Figure 498

MER STA 5 - Figure 498

K_{SCALE_{YM}}

- Defined in Section IV, ft3.

 κ_{Λ_1}

- Wing sweep correction factor, $\frac{\sin \Lambda}{\sin 45^{\circ}}$, where Λ is the quarter-chord sweep of the aircraft wing.

MER STATIONS 2, 4, and 6 (MS2,4,6):

$$\Delta \left(\frac{\underline{YM}}{\underline{q}}\right)_{\alpha=0} = \Delta C_{\eta_{\alpha=0}} K_{SCALE} K_{M}$$

$$MS2,4,6 MS2,4,6$$

where:

 $\Delta C_{\eta_{\alpha=0}}$ - Incremental $C_{\eta_{\alpha=0}}$ per degree β presented as a function of wing spanwise position for Mach numbers 0.7, 0.9, 1.05, 1.2, and 1.6, $\frac{1}{\text{deg}}$, Table 12.

 $K_{\text{SCALE}_{\text{YM}}}$ - Defined in Section IV, ft³.

 K_{Λ_1} - Defined in MS1,3,5 above.

The variation of $\Delta C_{\eta_{\alpha=0}}^{\rho_{\alpha=0}}$ for MER STATIONS 1-6 is presented at distinct Mach numbers of 0.7, 0.9, 1.05, 1.2, and 1.6. Table 12 presented below is a guide for locating the curves for $\Delta C_{\eta_{\alpha=0}}^{\rho_{\alpha=0}}$ for each MER station at the Mach numbers indicated above. For Mach numbers between 0.5 and 0.7, the value at M = 0.7 should be used in the computation. For Mach numbers between 0.7 and 1.6 other than those distinctly presented, linear interpolation should be used between the appropriate Mach numbers to obtain the required value for computation.

TABLE 12. INCREMENTAL YAWING MOMENT INTERCEPT COEFFICIENT DUE TO YAW - FIGURE LOCATION GUIDE

	MACH NUMBERS										
^{ΔC} η _{α=0β}	0.7	0.9	1.05	1.2	1.6						
	Figure Numbers										
MER STA 1	488	490	492	494	496						
MER STA 2	489	491	493	495	497						
MER STA 3	488	490	492	494	496						
MER STA 4	489	491	493	495	497						
MER STA 5	488	490	492	494	496						
MER STA 6	489	491	493	495	497						

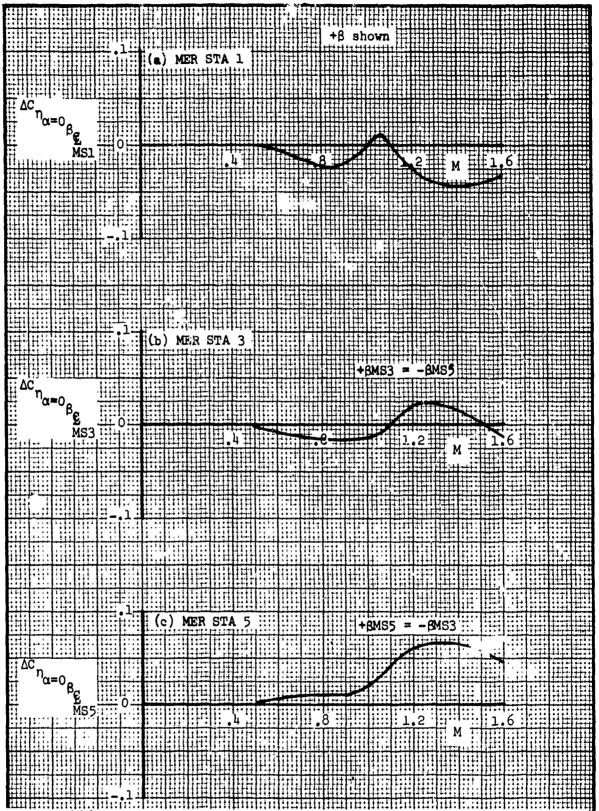
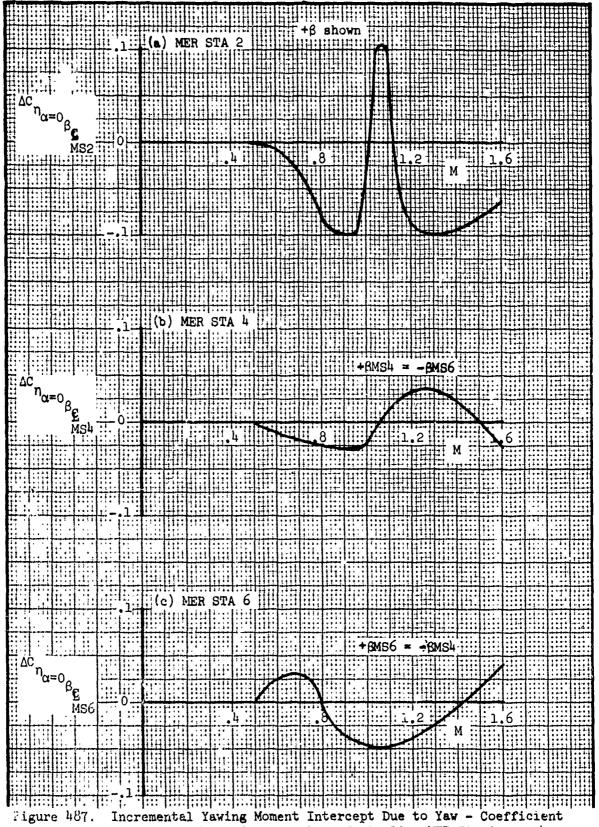


Figure 486. Incremental Yawing Moment Intercept Due to Yaw - Coefficient for Stores Mounted on Fuselage Centerline MER Stations 1, 3, and 5



for Stores Mounted on Fuselage Centerline MER Stations 2,4, and 6

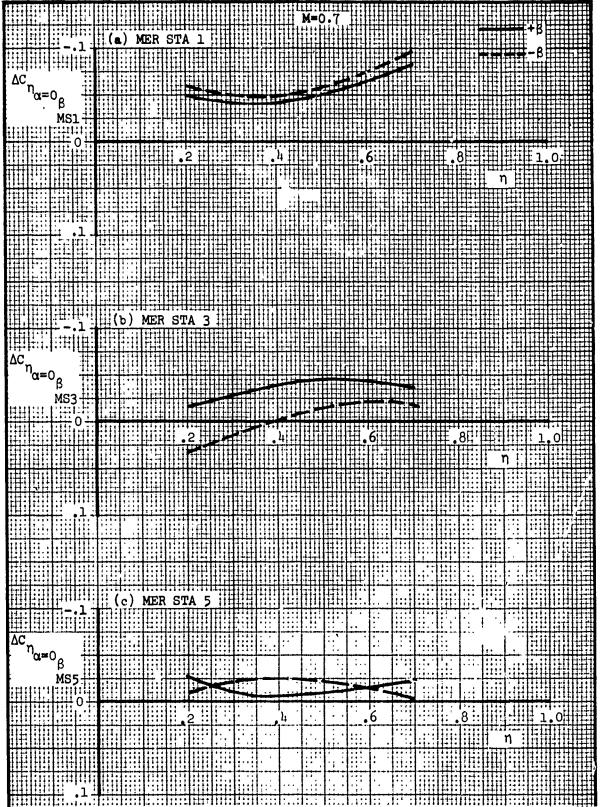
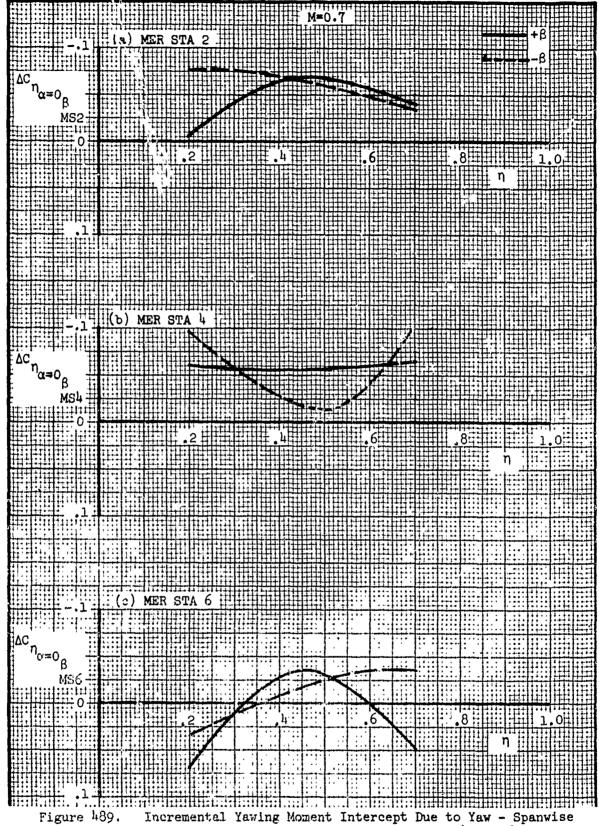


Figure 488. Incremental Yawing Moment Intercept Due to Yaw - Spanwise
Correction at M = 0.7 for MER Stations 1, 3 and 5



Incremental Yawing Moment Intercept Due to Yaw - Spanwise Correction at M = 0.7 for MER Stations 2, 4 and 6

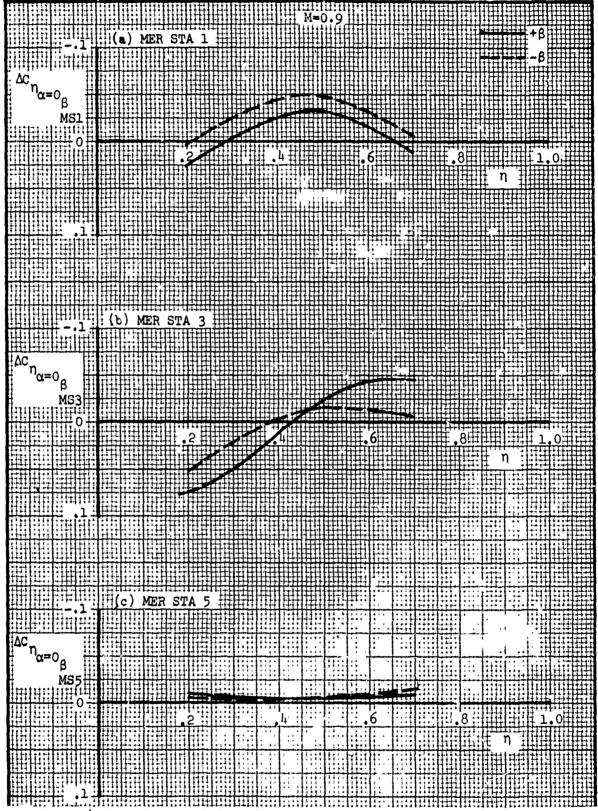


Figure 490. Incremental Yawing Moment Intercept Due to Yaw - Spanwise Correction at M = 0.9 for MER Stations 1, 3 and 5

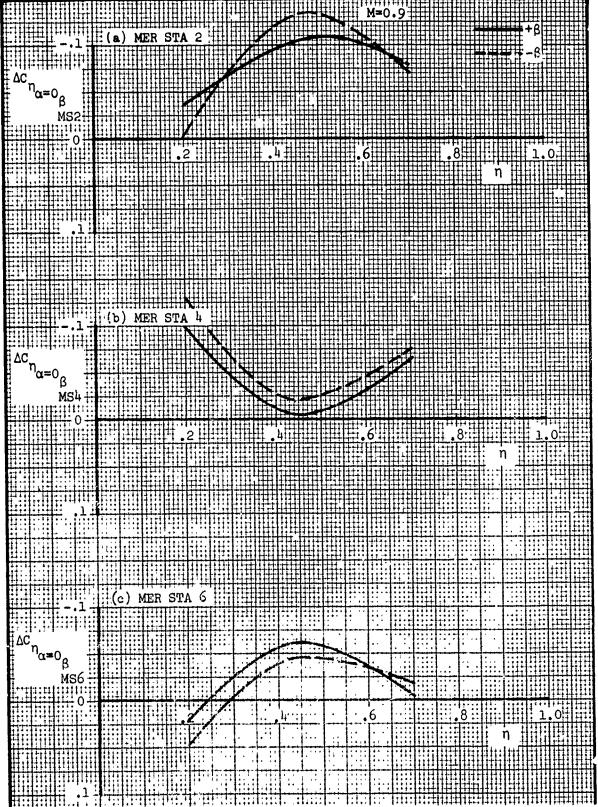


Figure 491. Incremental Yawing Moment Intercept Due to Yaw - Spanwise Correction at M = 0.9 for MER Stations 2, 4 and 6

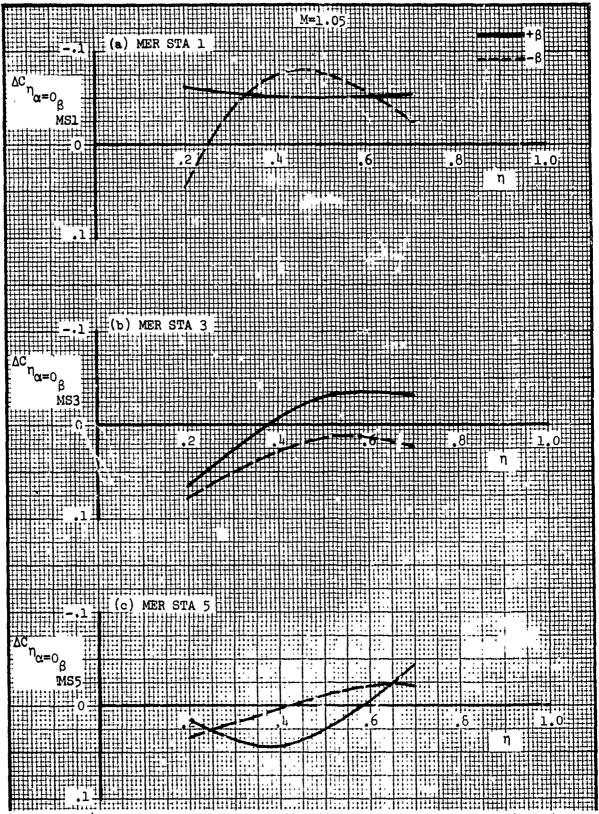
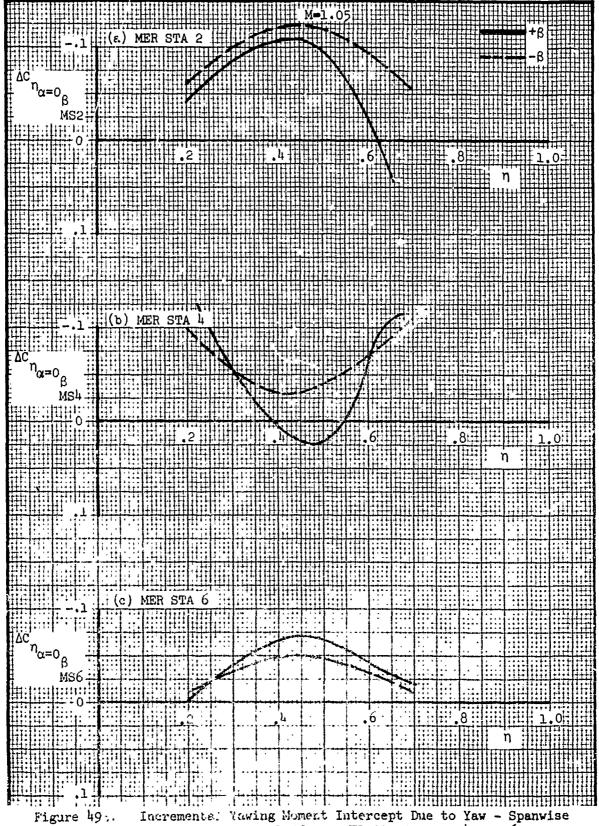


Figure 492. Incremental Yawing Moment Intercept Due to Yaw - Spanwise Correction at M = 1.05 for MER Stations 1, 3 and 5



Incremental Yawing Moment Intercept Due to Yaw - Spanwise Correction at M = 1.05 for MER Stations 2, 4 and 6

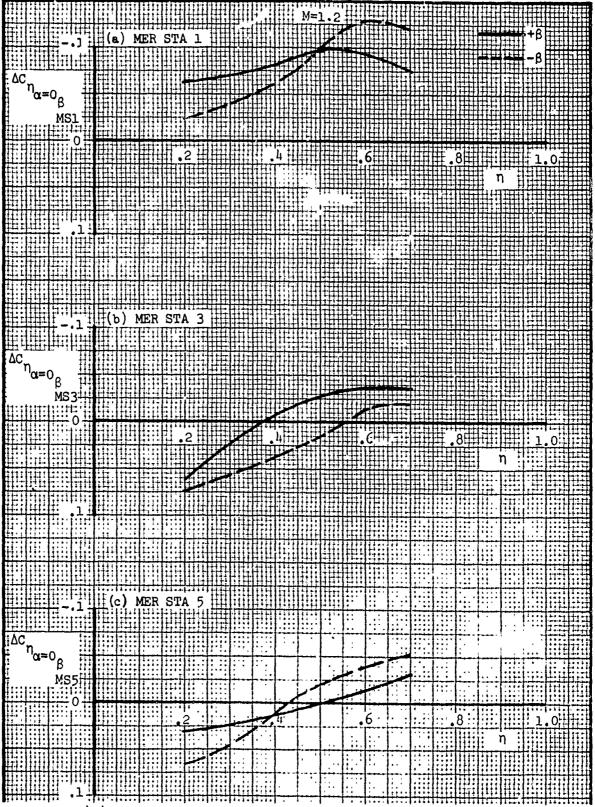


Figure 494. Incremental Yawing Moment Intercept Due to Yaw - Spanwise Correction at M = 1.2 for MER Stations 1, 3 and 5

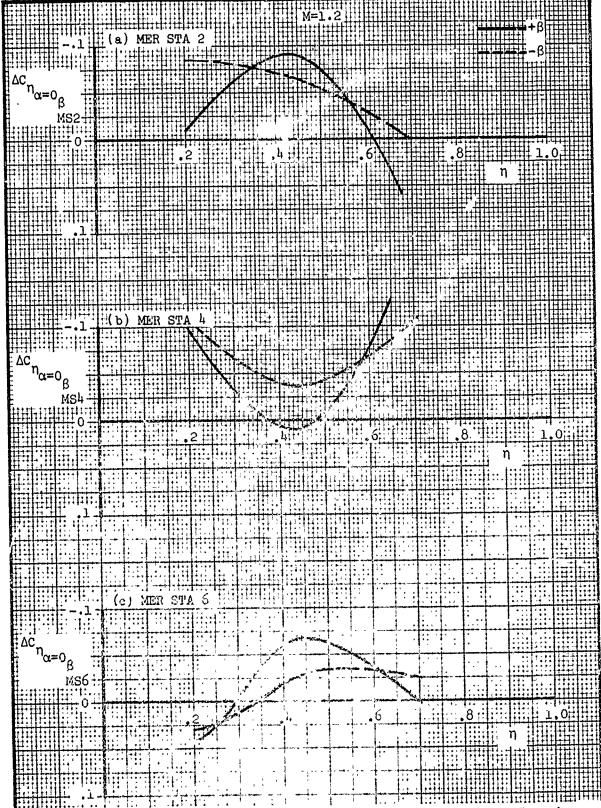


Figure 1999. Incremental To. 100 Homent Intercept Due to Yaw - Spanwise Correction of Har 2 for MER Stations 2, 4 and 6

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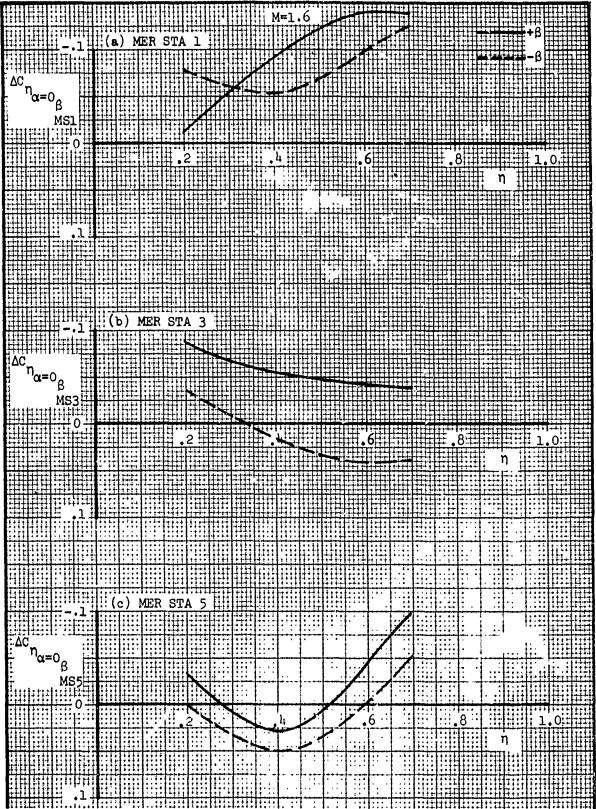


Figure 496. Incremental Yawing Moment Intercept Due to Yaw - Spanwise Correction at M = 1.6 for MER Stations 1. 3 and 5

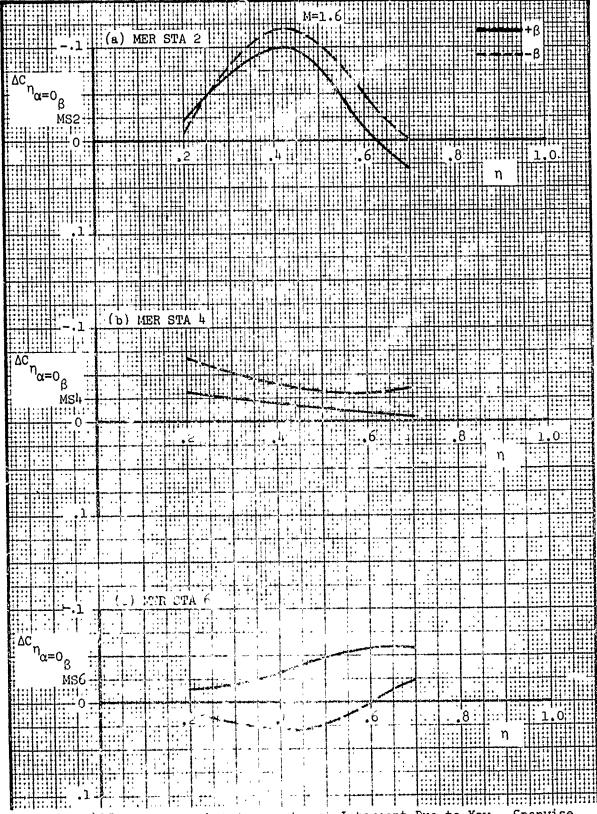


Figure 497. Incremental Issuer Mamont Intercept Due to Yaw - Spanwise Unrection at 12 = 1.6 for MER Stations 2, 4 and 6

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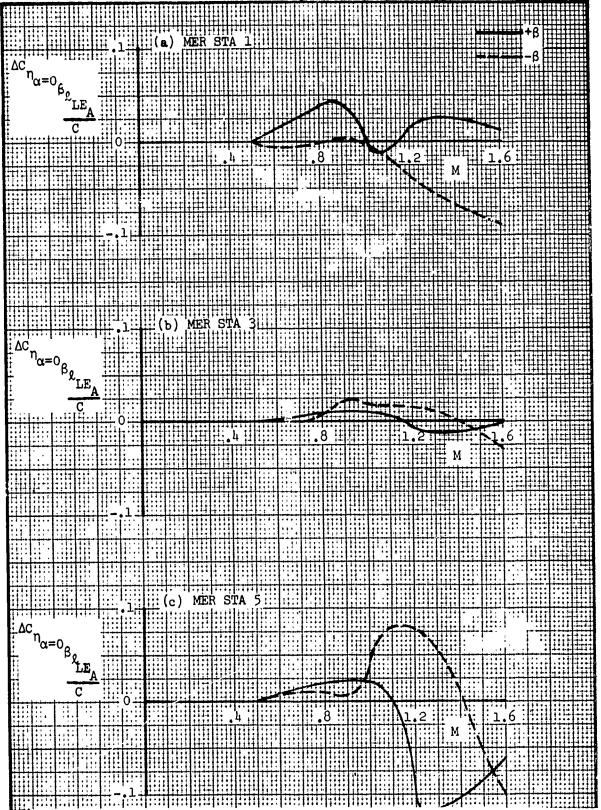


Figure 498. Incremental Yawing Moment Intercept Due to Yaw - Chordwise Correction for MER Stations 1, 3 and 5

4.2.3 Increment-Adjacent Store Interference

Methods to predict the increment in captive store yawing moment variation with angle of attack, $\Delta \left(\frac{YM}{q}\right)_{CL}$, and the value TNTF

at $\alpha=0$, $\Delta\left(\frac{YM}{q}\right)_{\alpha=0}$, for multiple carried stores are presented within INTF

this section. The basic prediction is made as a function of minimum store to store separation distance, y_{INTF} (see Subsection 3.1.3), at discrete Mach numbers. The data are presented separately for the aft cluster of stores on MER STATIONS 1, 3, and 5, and the forward cluster, MER STATIONS 2, 4, and 6. Predictions are also separately made for inboard-outboard interference, the interfering store carried inboard of the subject captive store, and outboard-inboard interference, the interfering store carried outboard of the subject captive store. On the curves defining the basic prediction, ADJ.

SHOULDER refers to the MER shoulder store adjacent to the interfering store, OPPOSITE SHOULDER is the MER shoulder store furthest displaced laterally from the interfering store, and & STORE is the MER centerline store, MER STATION 1 or 2.

4.2.3.1 Slope Prediction

The equations governing the prediction of incremental yawing moment variation with angle of attack are presented below:

INTERFERING STORES CARRIED INBOARD

MER STATIONS 1,2,3,4,5, and 6 (MS1-6):

AT A GIVEN MACH NUMBER:

$$\Delta \left(\frac{YM}{q}\right)_{CC} = \left(\sum \Delta C_{\eta_{CC}}\right) K_{SCALE_{YM}}$$

$$INTF$$

$$MS1-6$$

$$IB+OB$$

$$MS1-6$$

where:

K_{SCALE_{YM}} - Yawing moment scale factor, ft³, see Section IV.

INTERFERING STORES CARRIED OUTBOARD

MER STATIONS 1, 2, 3, 4, 5, and 6 (MS1-6):

AT A GIVEN MACH NUMBER:

$$\Delta \left(\frac{\underline{YM}}{\underline{q}}\right)_{\alpha} = \left(\sum \Delta C_{\eta_{\alpha}} + \sum \Delta^{2}C_{\eta_{\alpha}}\right) K_{SCALE_{\underline{YM}}}$$

$$\stackrel{INTF}{MS1-6} = 0$$

$$0 + 1B \qquad MS1-6$$

$$MS1-6$$

where:

- Increment to ΔC for the forward and

INTF

OB>IB

aft cluster as a function of store nose

separation, $\sqrt{x_{INTF}^2 + y_{INTF}^2}$ (see Subsection 3.1.3),

which is assumed to be negative when the interfering store is aft of the subject captive store, $\frac{1}{\deg}$, Figures 514 and 515.

K_{SCALE</sup>YM - Yawing moment scale factor, ft³, see Section IV.}

INTERFERING STORES CAPRIED INBOARD AND OUTBOARD

MER STATIONS 1, 2, 3, 4, 5, and 6 (MS1-6):

AT A GIVEN MACH NUMBER:

where:

- Intercept for the inboard - outboard combination correction for yawing moment slope, $\frac{1}{\deg}$, Figure 517.

K_{SLOPE₁} - Slope for the inboard - outboard combination correction for yawing moment slope, Figure 516.

 $\Delta C_{\eta_{\alpha}}$ - Previously defined. INTF IB+OB

 $\Delta C_{\eta_{\Omega}}$ - Previously defined. INTF OB->IB

 $\Delta^2 C_{\eta_{\mbox{\scriptsize α}}}$ - Previously defined. INTF

 $K_{\text{SCALE}_{\underline{YM}}}$ - Yawing moment scale factor, ft³, see Section IV.

The above equations define the interference increment calculation at a given Mach number. For Mach numbers other than those presented, M = 0.7, 0.9, 1.05, 1.2, 1.6, these guidelines should be followed. If the subject Mach number is less than M = 0.7 use the value at M = 0.7. For other Mach numbers linear interpolation should be used between the Mach numbers which are presented.

TABLE 13. INCREMENTAL YAWING MOMENT STOPE COEFFICIENT DUE TO INTERFERENCE - FIGURE LOCATION GUIDE

^{ΔC} η _α INTF	0.7	0.9	MACH NUMBE 1.05	IR 1.2	1.6	
		Fi	gure Numbe	er	· · · · · · · · · · · · · · · · · · ·	
Adj. Shoulder-	,					ł
Fwd. Cluster	499	500	501	502	503	
Adj. Shoulder-						
Aft Cluster	499	500	501	502	503	ĺ
0.0						1
g Store-						ł
Fwd. Cluster	504	505	506	507	508	Ì
€ Store-						-
Aft Cluster	504	505	506	507	508	İ
Onwedte Chaulden						l
Opposite Shoulder- Fwd. Cluster	500	57.0				1
rwd. Ciuscer	509	510	511	512	513	١
Opposite Shoulder-		•				- [
Aft Cluster	509	510	511	512	513	

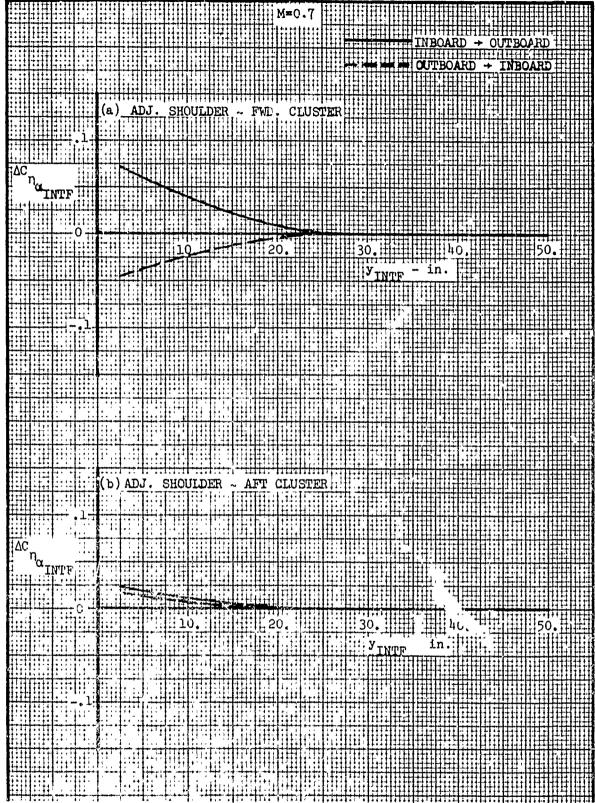


Figure 469. Incremental Yaving Moment Intercept Due to Interference - Adjacent Shoulder at M = 0.7

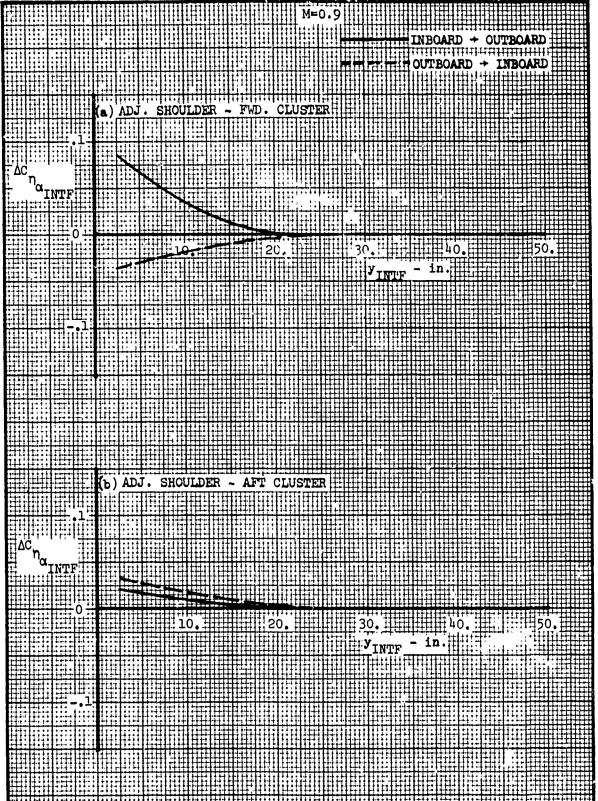


Figure 500. Incremental Yawing Moment Slope Due to Interference - Adjacent Shoulder at M = 0.9

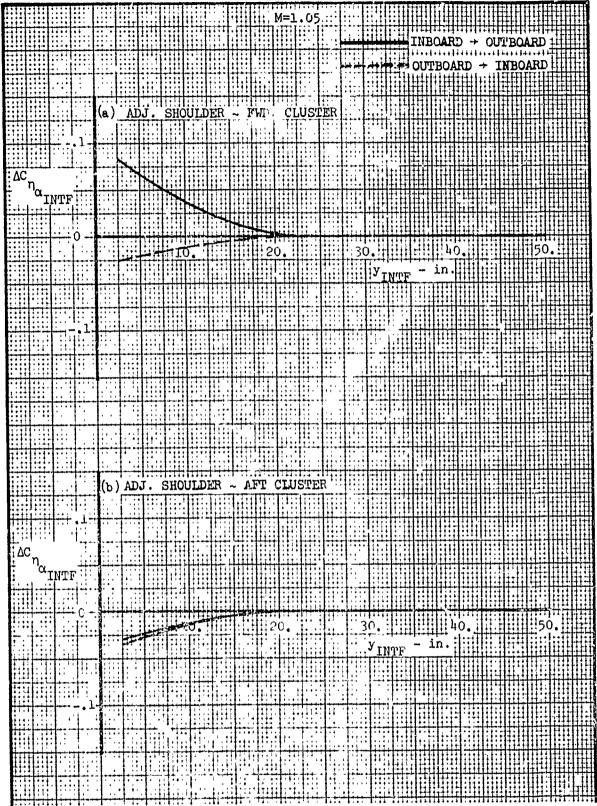


Figure 501. Incremental Yawing Momint Slope Due to Interference - Adjusent Shoulder at M = 1.05

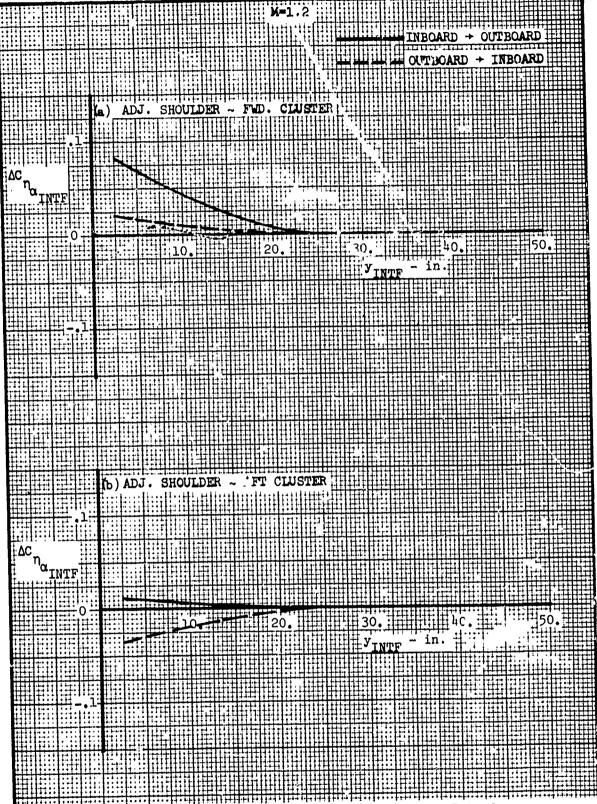


Figure 502. Incremental Yawing Moment Slope Due to Interference - Adjacent Shoulder at M = 1.2

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Figure 503. Incremental Yawing Moment Slope Due to Interference - Adjacent Shoulder at 11 = 1.6

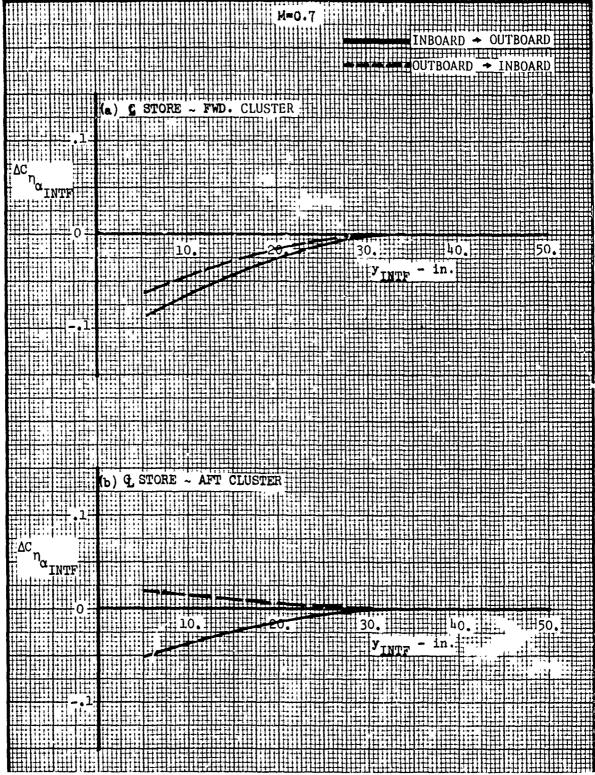


Figure 504. Incremental Yawing Moment Slope Due to Interference - Centerline Store at M = 0.7

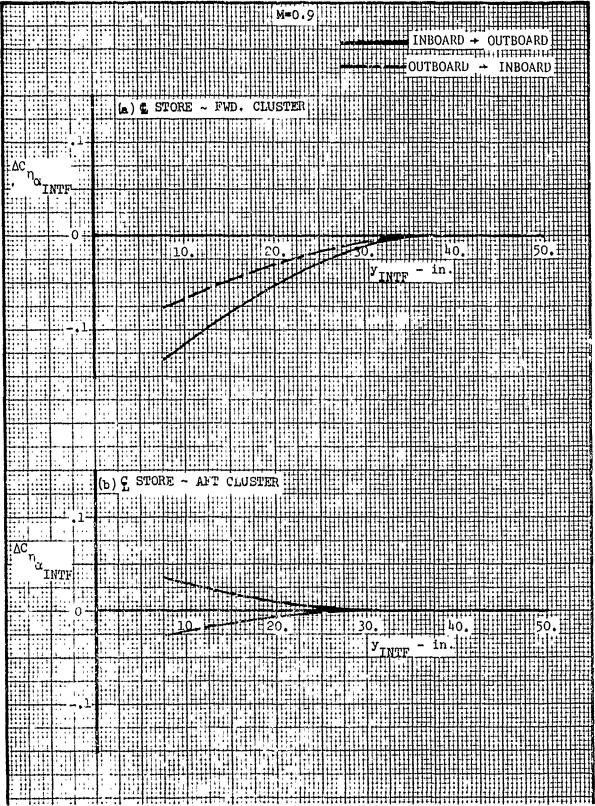


Figure 505. Incremental Yewing Moment Slope Due to Interference - Centerline Store at M = 0.9

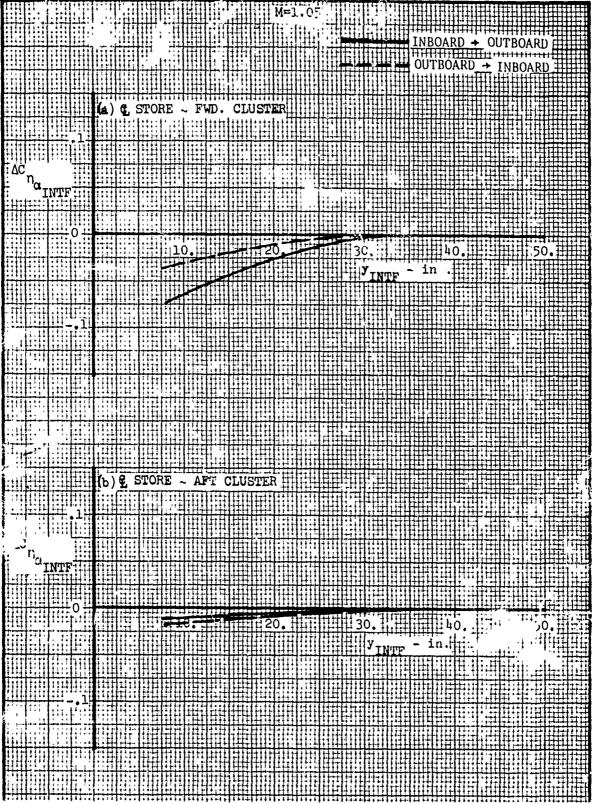


Figure 506. Incremental Yawing Moment Slope Due to Interference - Centerline Store at M = 1.05

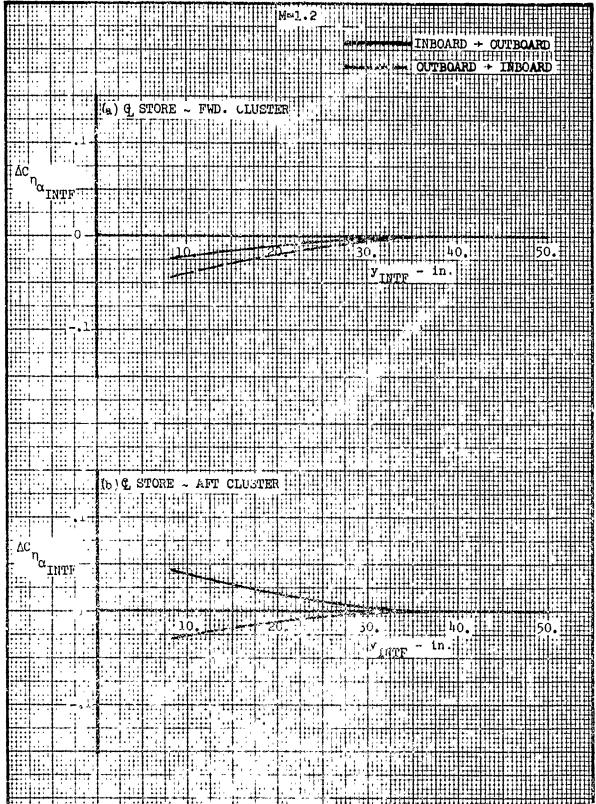


Figure 507. Incremental Yawing Moment Slope Due to Interference - Centerline Store at H = 1.2

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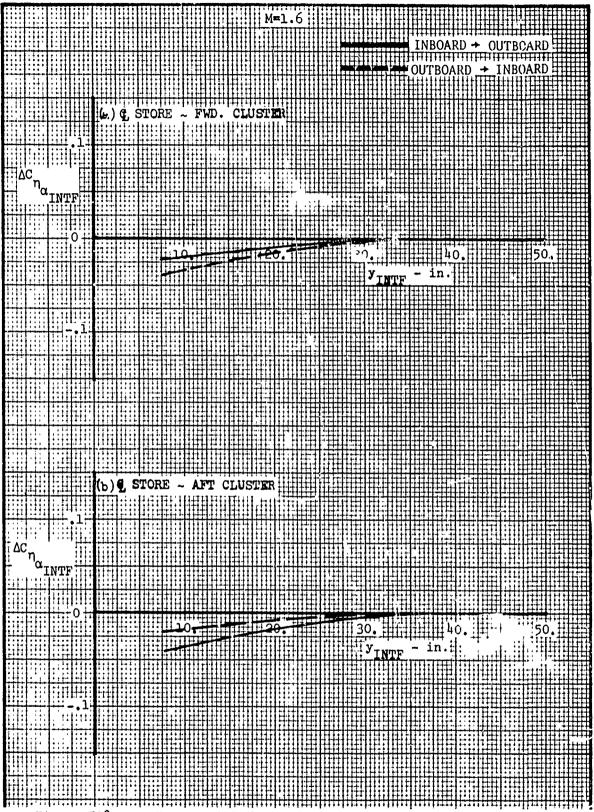


Figure 508. Incremental Yawing Moment Slope Due to Interference - Centerline Store at M = 1.6

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		b) OPI	POSITE	SHO	ULDET	· · · ·	FT CI	USTER		
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- AC na lift	1	b) OPI	POSITE	SHO	ULDE	~ J	FP C1	USTER		
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Figure 509. Incremental fawing Moment Slope Due to Interference - Opposite another at M + 0.7

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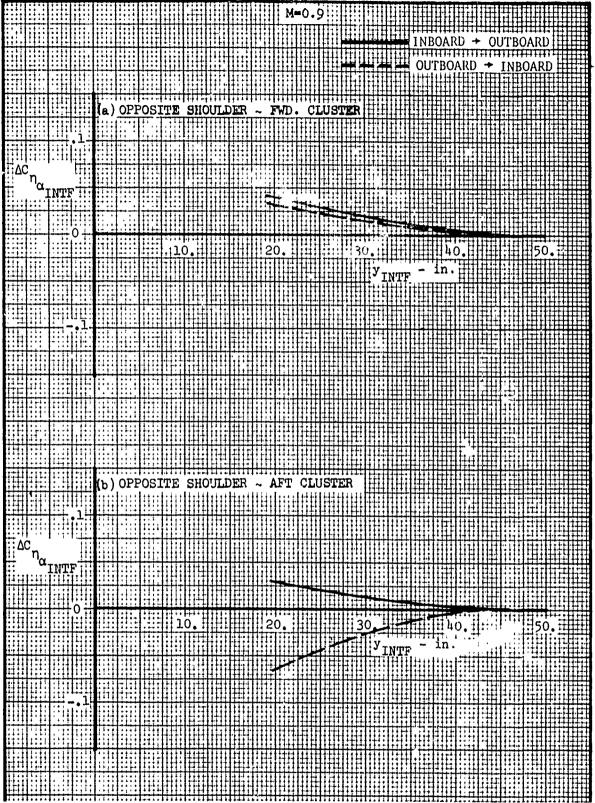


Figure 510. Incremental Yawing Moment Slope Due to Interference - Opposite Shoulder at M = 0.9

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Figure 511. Theremoused Y wing Moment. Stope Due to Interference Opposite Shoulder at N = 1.05

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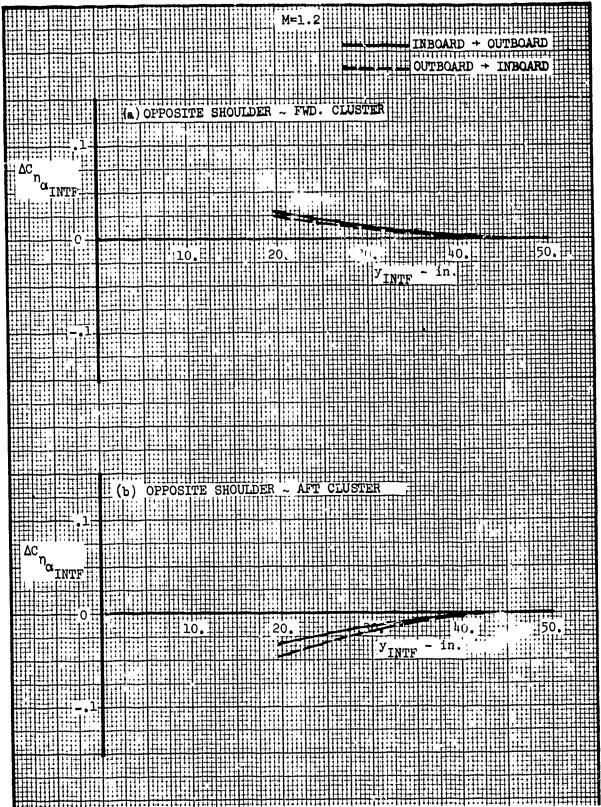


Figure 512. Incremental Yawing Moment Slope Due to Interference - Opposite Shoulder at M = 1.2

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			OUTB	OARD + INBOARD
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Figure 513. Increment: Yasing Moment Slope Due to Interference - Opposite Shoulder at H = 1.6

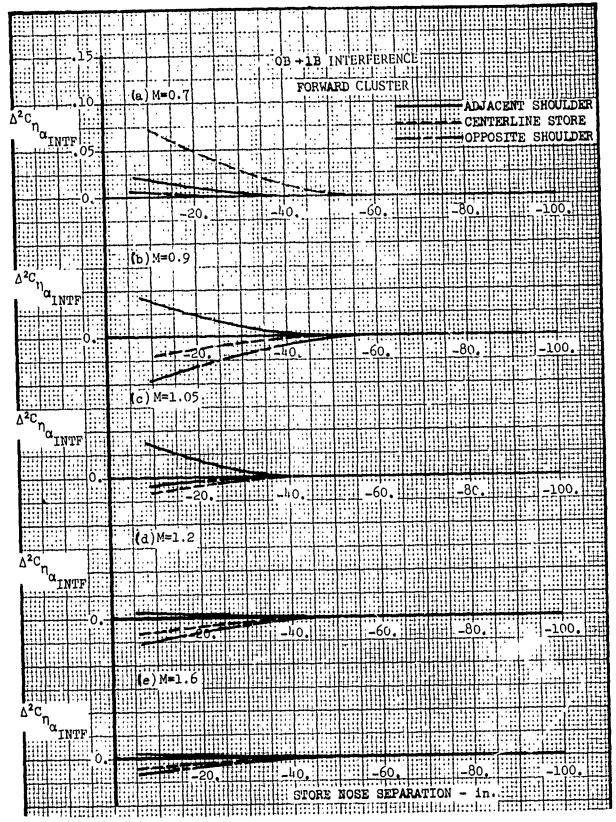


Figure 514. Incremental Yawing Moment Slope Due to Interference - Outboard to Inboard Interference Correction for the Forward Cluster

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Figure 515. Incremental Yawing Moment Slope Due to Interference - Outboard to Inboard Interference Correction for the Aft Cluster

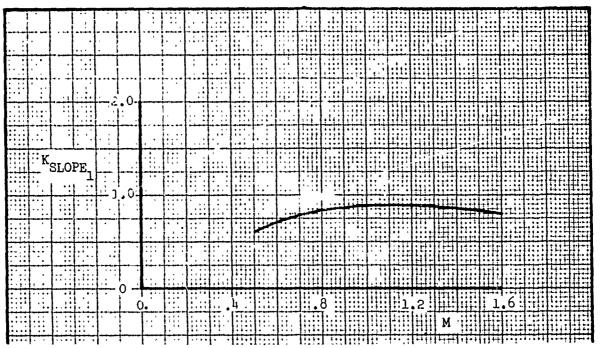


Figure 516. Incremental Yawing Moment Slope Due to Interference - K_{SLOPE}₁ for Combination Inboard and Outboard Interference

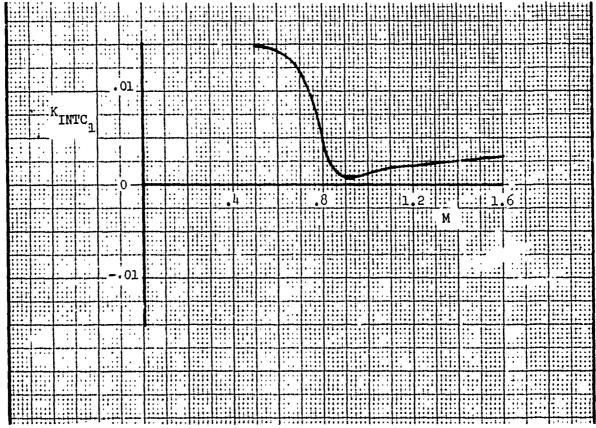


Figure 517. Incremental Yawing Moment Slope Due to Interference - $K_{\mbox{INTC}}$ for Combination Inboard and Outboard Interference

4.2.3.2 Intercept Prediction

The equations governing the prediction of incremental yawing moment intercept are presented below.

INTERFERING STORES CARRIED INBOARD

MER STATIONS 1, 2, 3, 4, 5, and 6 (MS1-6):

AT A GIVEN MACH NUMBER:

$$\Delta \left(\frac{YM}{Q}\right) = 0 = \left(\sum \Delta C_{\eta_{Q}}\right) K_{SCALE_{YM}}$$

$$MS1-6$$

$$INTF$$

$$IB \rightarrow OB$$

$$MS1-6$$

where:

 $K_{\text{SCALE}_{\text{YM}}}$ - Yawing moment scale factor, ft³, see Section IV.

INTERFERING STORES CARRIED OUTBOARD

MER STATIONS 1, 2, 3, 4, 5, and 6 (MS1-6):

AT A GIVEN MACH NUMBER:

$$\Delta \left(\frac{\text{YM}}{\text{q}}\right)_{\alpha \approx 0} = \left(\sum \Delta C_{\eta_{\alpha=0}} + \sum \Delta^2 C_{\eta_{\alpha=0}}\right) K_{\text{SCALE}_{YM}}$$

$$\text{INTF} \qquad \text{INTF}$$

$$OB+IB \qquad MS1-6$$

$$MS1-6$$

where:

 $\begin{array}{lll} \Delta C & - & \text{Incremental yawing moment intercept coefficient} \\ \eta_{\alpha=0} & & \text{due to outboard to inboard interference as} \\ & & \text{OB+IB} & \text{a function of y}_{\text{INTF}}, \text{ see Table 14.} \end{array}$

 $\Delta^2 C_{\eta_{\alpha=0}}$ - Increment to $\Delta C_{\eta_{\alpha=0}}$ for the forward and INTF OP+IB

aft cluster as a function of store nose separation, $\sqrt{x_{\rm INTF}^2 + y_{\rm INTF}^2}$ (see Subsection 3.1.3) which is assumed to be negative when the interfering store is aft of the subject captive store, Figures 533 and 534.

 $K_{\text{SCALE}_{\text{YM}}}$ - Yawing moment scale factor, ft³, see Section IV.

INTERFERING STORES CARRIED INBOARD AND OUTBOARD

MER STATIONS 1,2,3,4,5,and 6 (MS1-6):

AT A GIVEN MACH NUMBER:

$$\Delta \left(\frac{\text{YM}}{\text{q}}\right)_{\alpha=0} = \left[K_{\text{INTC}_2} + K_{\text{SLOPE}} \right] \Delta C_{\eta_{\alpha=0}} + \sum \Delta C_{\eta_{\alpha=0}}$$

$$\text{INTF}$$

$$MS1-6$$

$$\text{INTF}$$

$$MS1-6$$

$$\text{INTF}$$

$$MS1-6$$

$$\text{INTF}$$

$$MS1-6$$

where:

- Intercept for the inboard-outboard combination correction for yawing moment intercept,
Figure 536.

K_{SLOPE₂} - Slope for the inboard-outboard combination correction for yawing moment intercept, Figure 535.

 $\Delta C_{\eta_{\alpha=0}}$ - Previously defined. INTF. IB+OB

 $\Delta c_{\eta_{\alpha=0}}$ - Previously defined. INTF OB+IB

 $\Delta^2 C_{\eta_{\alpha=0}}$ - Previously defined. INTF

K_{SCALE} - Yawing moment scale factor, ft³, see Section IV.

The above equations define the interference increment calculation at a given Mach number. For Mach numbers other than those presented, M = 0.7, 0.9, 1.05, 1.2, 1.6, these guidelines should be followed. If the subject Mach number is less than M = 0.7, use the value at M = 0.7. For other Mach numbers linear interpolation should be used between the Mach numbers which are presented.

TABLE 14. INCREMENTAL YAWING MOMENT INTERCEPT COEFFICIENT DUE TO INTERFERENCE - FIGURE LOCATION GUIDE

ΔC	MACH NUMBER											
ΔC η _{α=0} INTF	0.7	0.9	1.05	1.2	1.6							
	Figure Numbers											
Adj. Shoulder- Fwd. Cluster	518	519	520	521	522							
Adj. Shoulder- Aft Cluster	518	519	520	521	522							
ç Store- Fwd. Cluster	523	524	525	526	527							
& Store- Aft Cluster	523	524	525	526	527							
Opposite Shoulder- Fwd. Cluster	528	529	530	531	532							
Opposite Shoulder- Aft Cluster	528	529	530	531	532							

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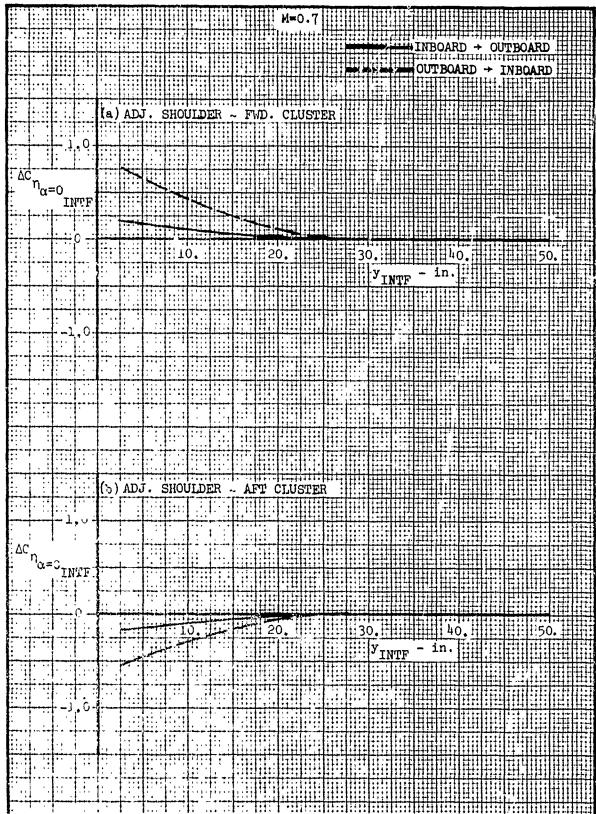


Figure 516 Incremental Yawing Moment Intercept Due to Interference - Adjacent Shoulder at M = 0.7

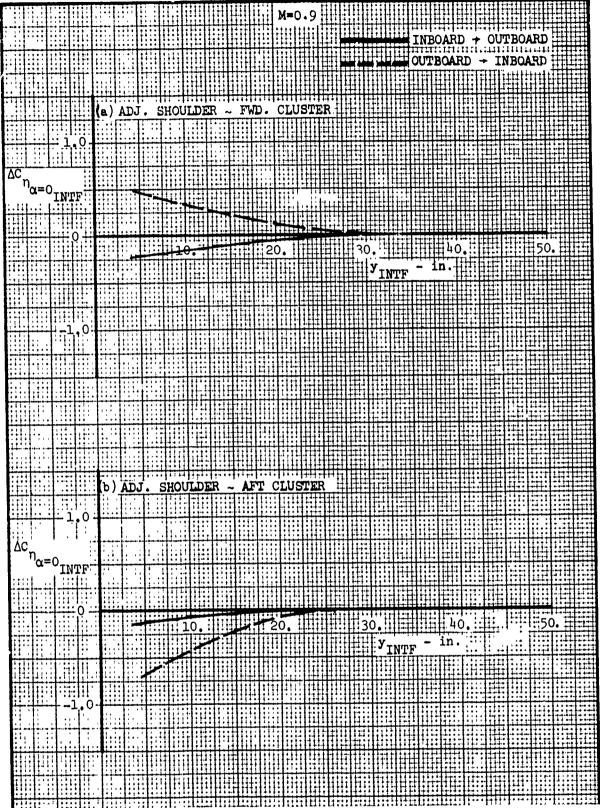


Figure 519. Incremental Yawing Moment Intercept Due to Interference - Adjacent Shoulder at M = 0.9

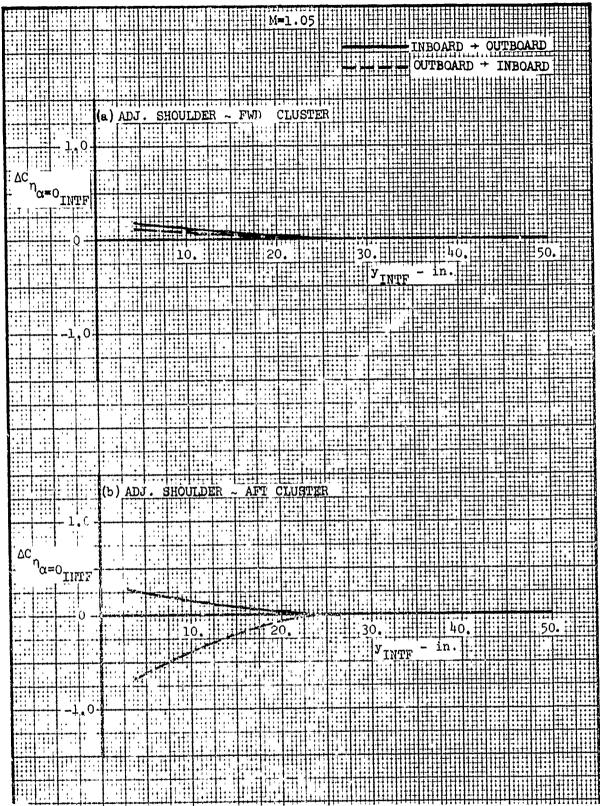


Figure 340. Incremental rawing Moment Intercept Due to Interference - Adjacent Shoulder of M = 1.05

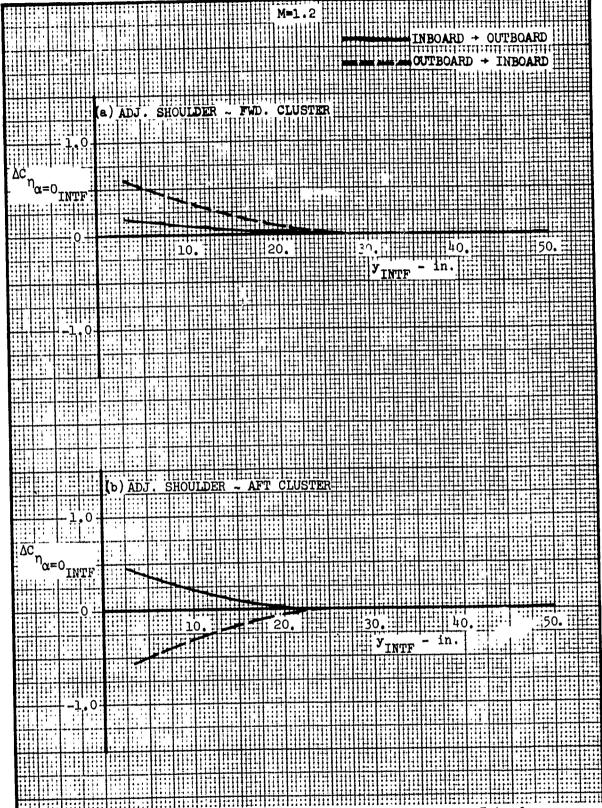


Figure 521. Incremental Yawing Moment Intercept Due to Interference - Adjacent Shoulder at M = 1.2

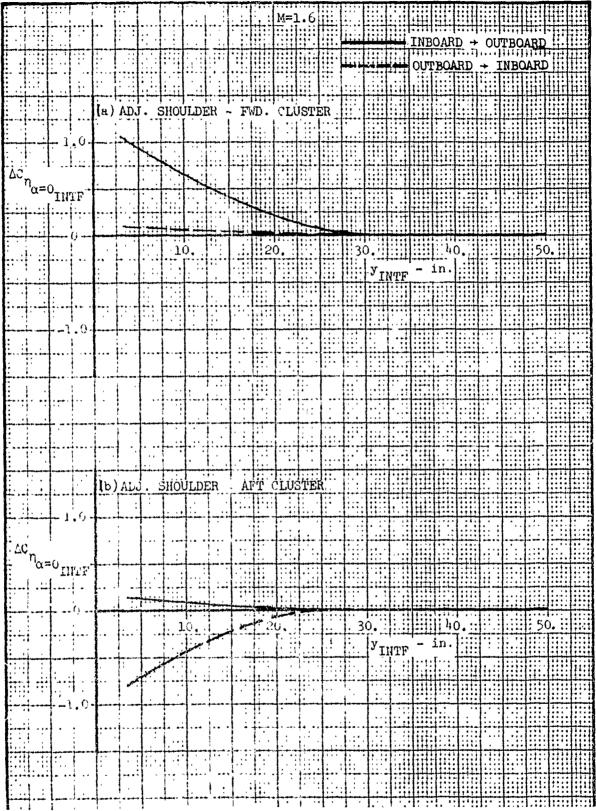


Figure 3 Incremental Yawing Moment Intercept Due to Interference - Adjacent Shoulder et M = 1.6

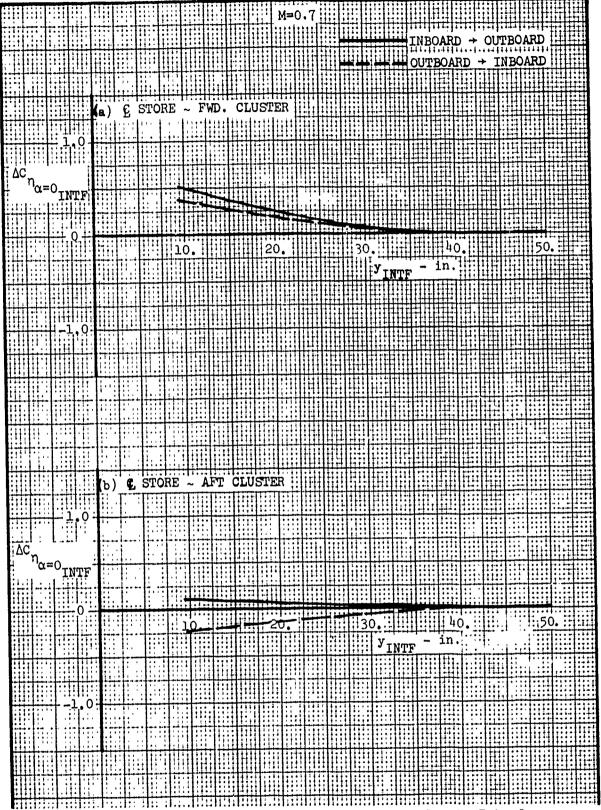


Figure 523. Incremental Yawing Moment Intercept Due to Interference - Centerline Store at M = 0.7

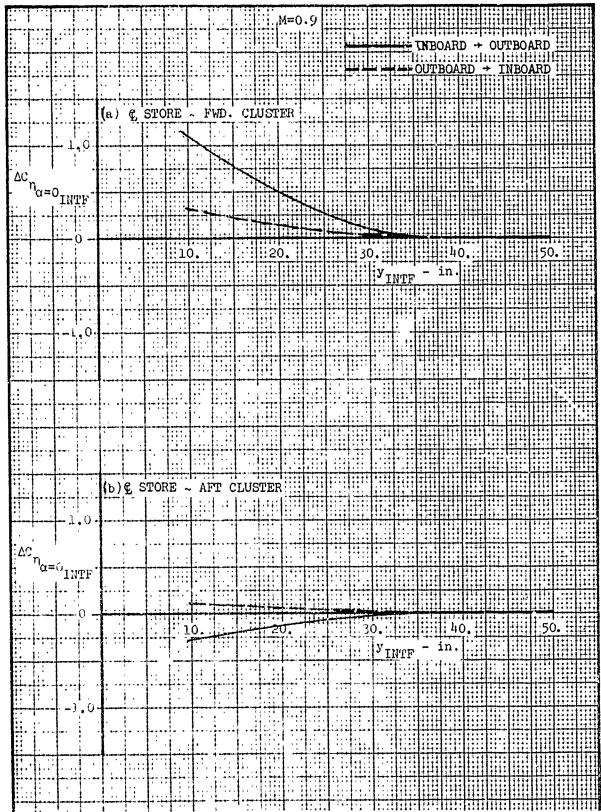


Figure 524. Increments I Yawing Moment Intercept Due to Interference - Centerline Store at M = 0.9

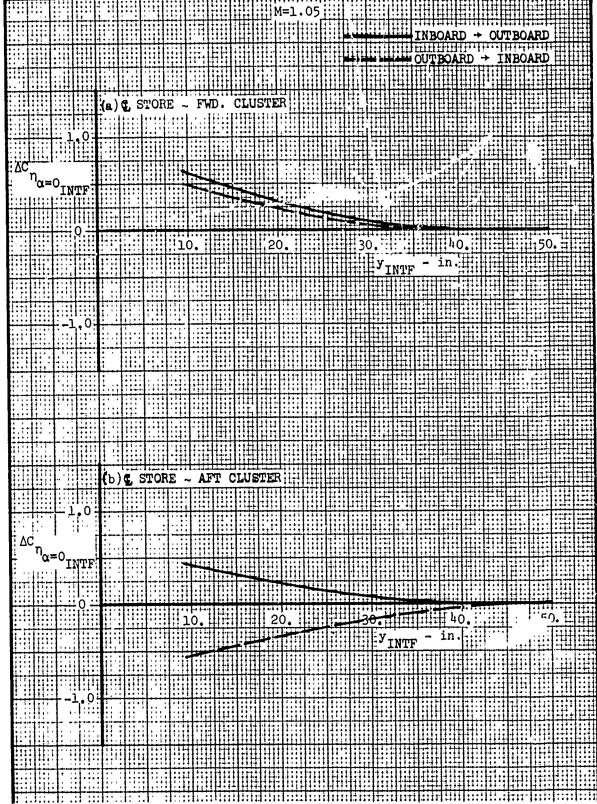
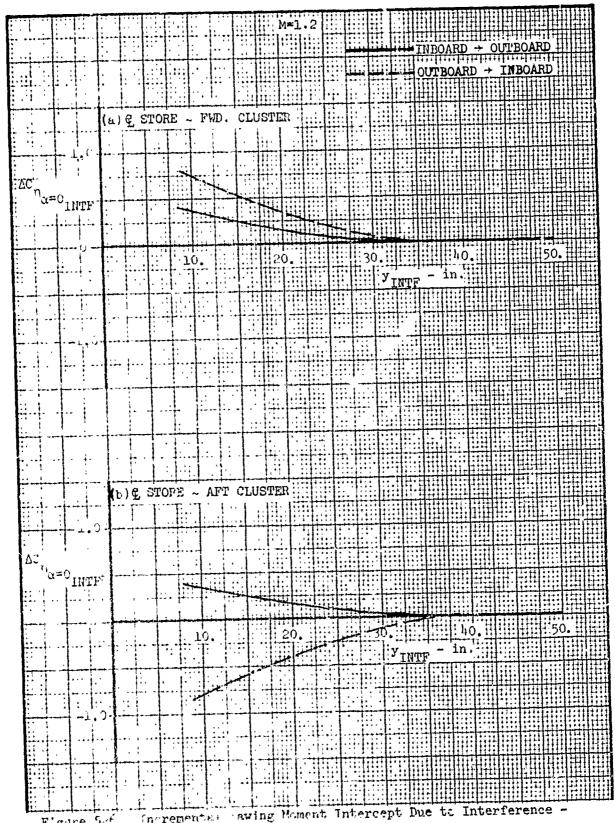


Figure 525. Incremental Yawing Moment Intercept Due to Interference Centerline Store at M = 1.05



Incremental lawing Moment Intercept Due to Interference Figure 5cf Cenverline Store at M=1.2.

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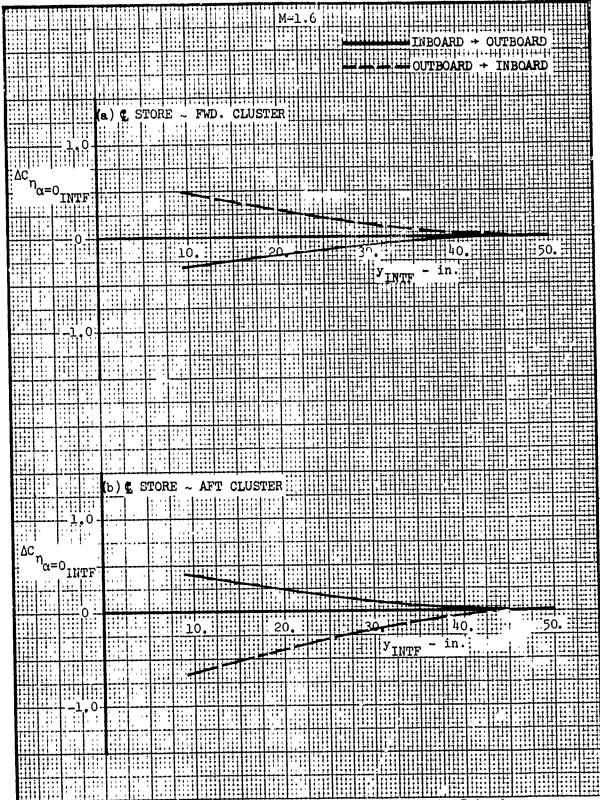


Figure 527. Incremental Yawing Moment Intercept Due to Interference - Centerline Store at M=1.6

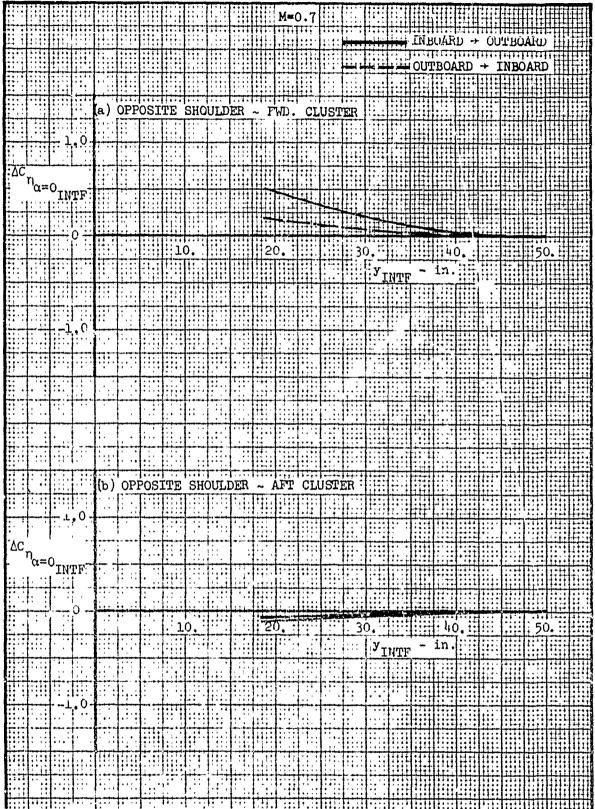


Figure 528. Incremental Yawing Moment Intercept Due to Interference Opposite Shoulder at M = 0.7

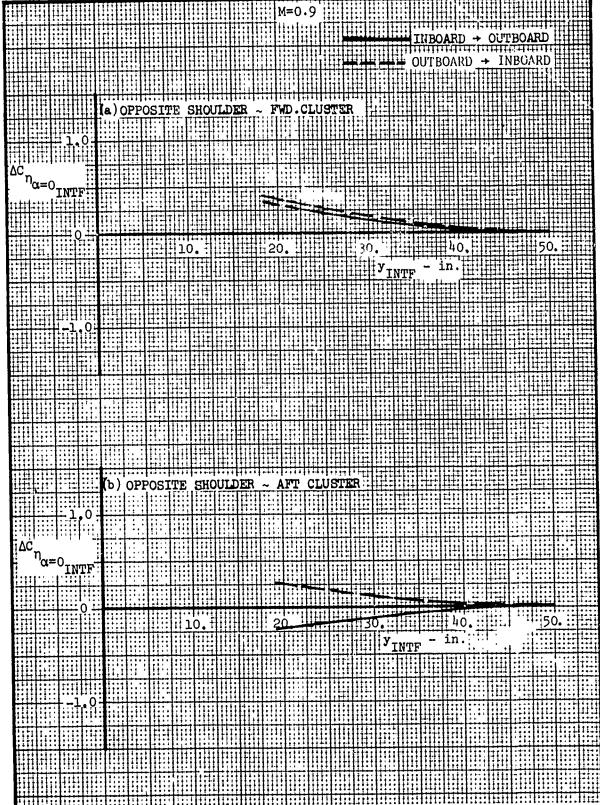


Figure 529. Incremental Yawing Moment Intercept Due to Interference - Opposite Shoulder at M = 0.9

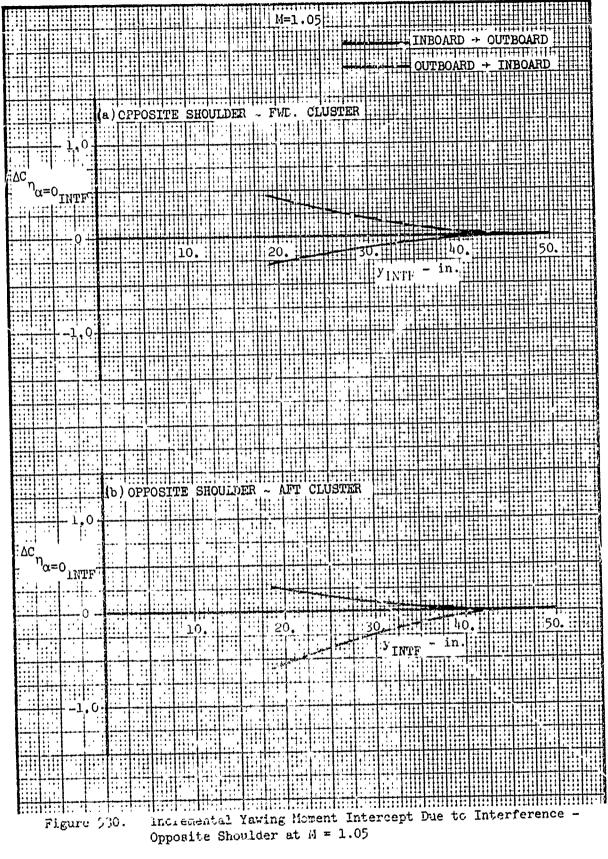


Figure 530.

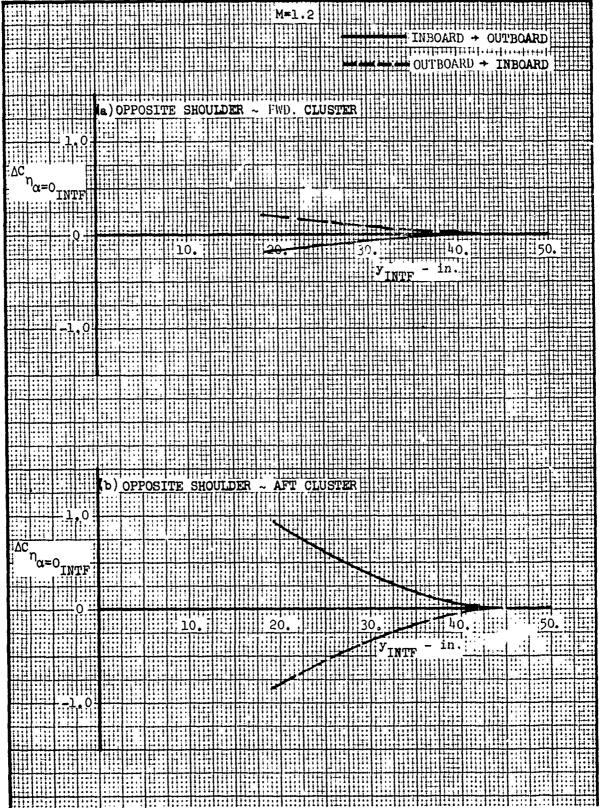


Figure 531. Incremental Yawing Moment Intercept Due to Interference - Opposite Shoulder at M = 1.2

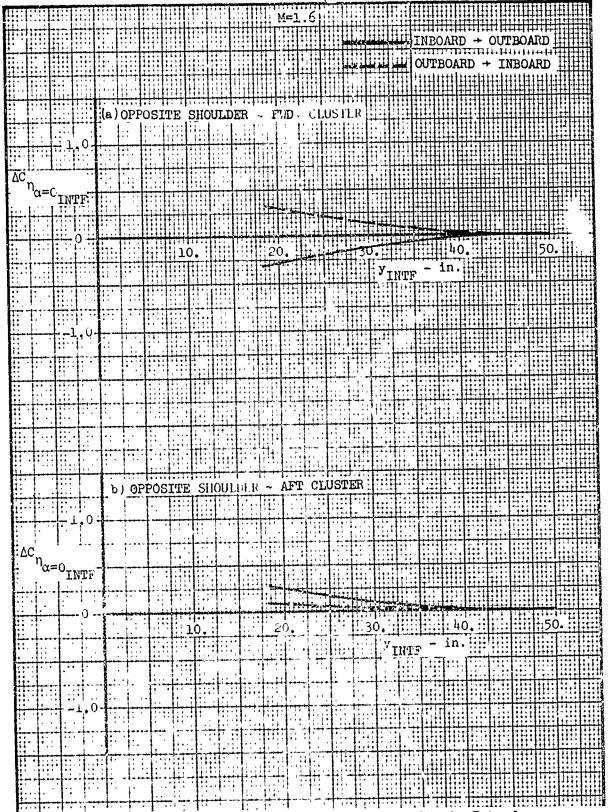


Figure 53. Incremental Yawing Moment Intercept Due to Interference - Ouposite Shoulder at M = 1.6

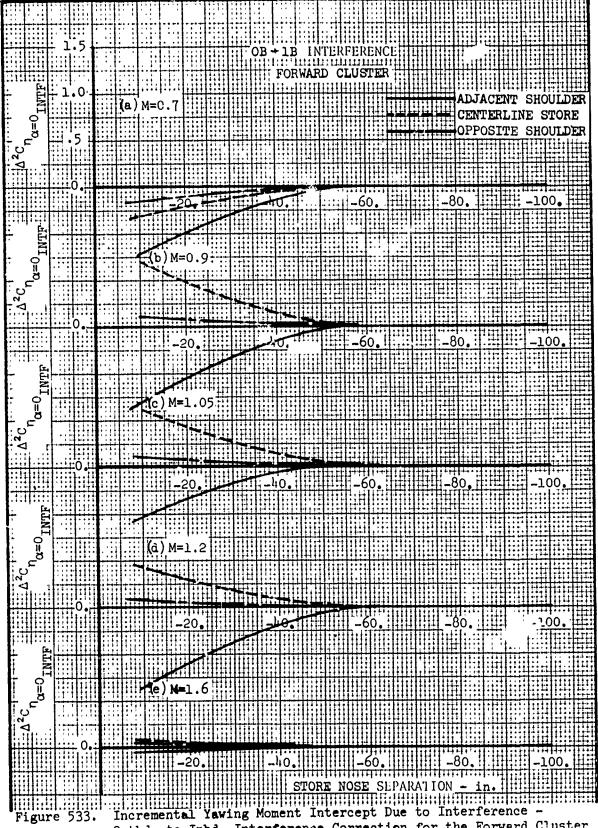


Figure 533. Outbd. to Inbd. Interference Correction for the Forward Cluster

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Figure '34. Incremental Yawing Homent Intercept Due to Interference Outboard to inboard Interference Correction for the Aft Cluster

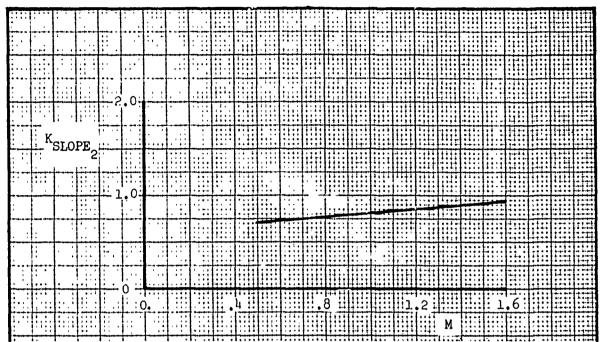


Figure 535. Incremental Yawing Moment Intercept Due to Interference - K_{SLOPE_2} for Combination Inboard and Outboard Interference

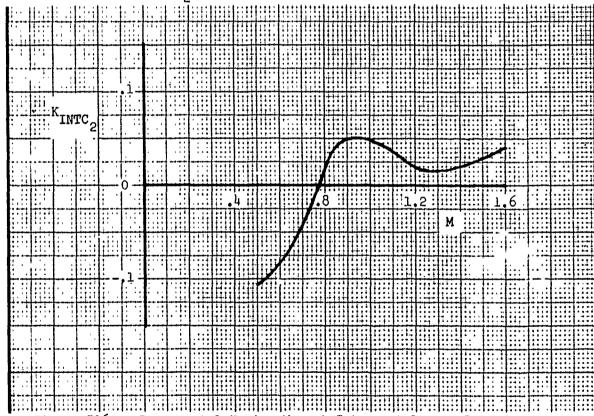


Figure 536. Incremental Yawing Moment Intercept Due to Interference - K_{INTC} for Combination Inboard and Outboard Interference

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